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Electrical World

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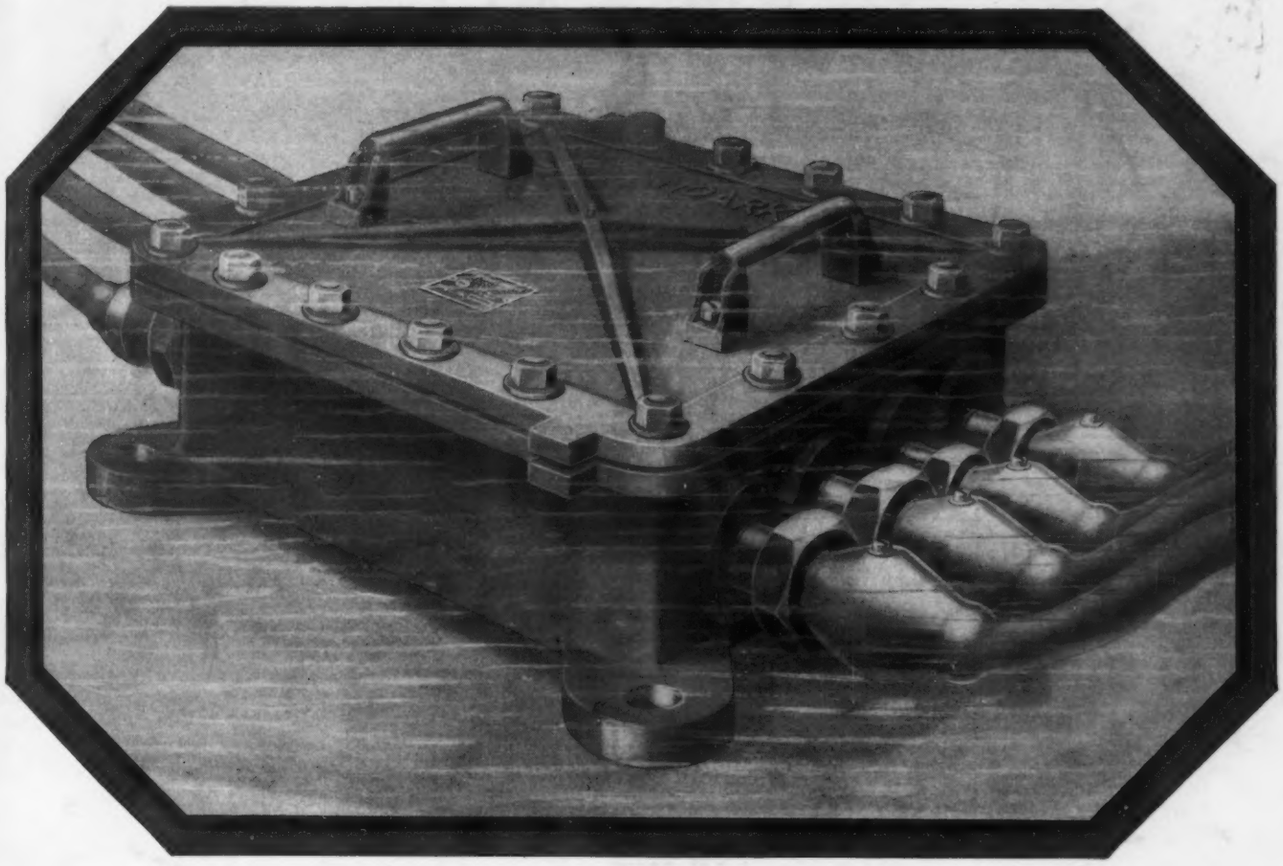

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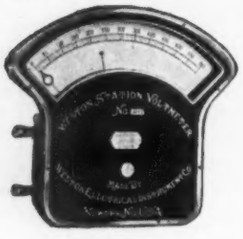

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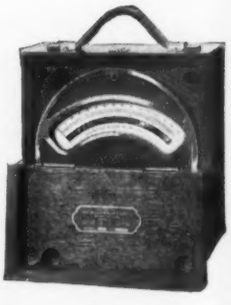

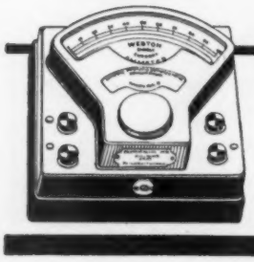

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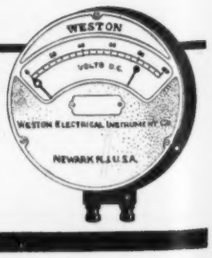

Electrical World

THE CONSOLIDATION OF ELECTRICAL WORLD, ELECTRICAL ENGINEER AND AMERICAN ELECTRICIAN

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W. H. ONKEN, JR.

Editor

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The Stone by the Roadside

TRAVELERS on the Lincoln Highway between Rahway and Metuchen, on their way from New York to Philadelphia, will notice beside the road as they approach Metuchen a huge boulder on which is a bronze tablet. The curious will pause to read, but the unheeding will pass on. Years from now, however, men and women will come from near and far to visit the spot and to reflect on the events it records. To the world of science and invention it will bear the same relationship that Plymouth Rock does to the Pilgrim Fathers and American history, or that the field of Runnymede bears to Magna Charta and English liberties. Today men travel to Stratford or to Vienna to view the abodes which once housed the genius of Shakespeare and the soul of Beethoven. Tomorrow they will also visit the stone by the roadside at Menlo Park, for on that spot once stood the laboratory in which Edison worked and where he created the electric incandescent lamp, the motion picture and the phonograph, all three of which have had a tremendous effect on the industrial and social life of the world. The monument is modest, but impressive in its simplicity; the events it commemorates will loom gigantic in human history.

Responsibility to the Investor

ELECTRIC utility securities are rightly in high favor with the investor. Advertisements of banking houses the country over declare the faith of the people and their financial advisers in this industry, and the rush to "get aboard" has never been equaled in electrical history. We are only well under way, however, in our progress toward the goal of intensively developed popular ownership, and if sound financing continues to be rigidly enforced, the popularity of electrical securities as outlets for savings in the next two decades will almost exceed belief.

Every great success is won in the face of danger, and the responsibility of the industry to keep a steady course and an even keel is sobering. The temptation of prosperity attracts the unscrupulous, and the industry must keep its eyes open and see to it that unworthy interests do not exploit the public in the name of electricity. So far a great record for stability has been made, but now and then organizations crop up with low ideals of service, seek to get control of properties with long and honorable histories, and by paying excessive prices for such control pave the way toward future overcapitalization and ultimate disaster. If this is done under the cover of centralized management, the state commissions can do little to control the situation through their regular supervision over local companies' securities, and the only remedy aside from federal supervision with all its drawbacks seems to be education as to what constitutes a sound investment.

Fortunately for the good name of the industry, such attempts are few and far between, but a very real responsibility lies upon the modern investment banker and the public utility man to co-operate in seeing to it that the public is told the truth about every issue of utility securities offered for sale in its territory and that unworthy securities are exposed to the light of economic analysis and publicity wherever and whenever such are placed on the market. Every industry and every calling in the world is cursed by a few black sheep, and in these hours of great and growing prosperity the electrical industry has a large responsibility upon its shoulders to watch and confute those who would unscrupulously exploit its success and so cast discredit upon its good name.

Will Circuit-Breaker Development Come Through Radical Changes?

MANUFACTURERS of oil circuit breakers are greatly to be commended on the steps they have taken to adapt their equipment to rupturing large-power currents, the problem lying as much if not more with large-current, low-voltage circuits as with super-voltage, small-current circuits. Used in differing degrees are multibreaks, high separation speed, partial inclosure of arcing region, rugged switch tanks and relief of stresses. How much higher the rupturing capacity of circuit breakers can be raised with these means is a question—enough of one to make it wise to reconsider more extensively the use of shunted auxiliary resistors or reactors, a non-inflammable substitute for transil oil and mechanical and electrical deflection of the arcs.

When shunted auxiliary resistors and reactors were first tried in this country and abroad, other more inexpensive means of increasing rupturing capacity were available, so that while this method functioned satisfactorily, it was hardly justified economically. As larger rupturing capacities are needed it may be necessary to fall back on this additional method. Recent tests have proved it very effective. It remains for users to determine whether the expense and complexity are justified.

Numerous tests have been made in the past to find a substitute for transil oil, considerable attention having been given to carbon tetrachloride. It might be well to review the experience with this and other substitutes considered and search for new substitutes. Placing the whole burden of handling large power currents on circuit breakers is not necessary. Operators have found that by arranging generating apparatus and interconnecting circuits so that the amount of current which can flow through a circuit is limited, the duty on oil circuit breakers can be greatly limited. Paralleling of generators at remote points and the use of

isolated phases and single-conductor cables offer possibilities. Here is where the ingenuity of the operator coupled with that of the manufacturer can meet the problems of the future. It appears that more consideration might also be given to the installation of indoor breakers as at the Echota substation of the Niagara Falls Power Company. Without being installed so that they have to withstand outdoor conditions, they are arranged along outside walls liberally vented to atmosphere in such a way that no explosion would be at all likely to wreck the building.

In general, reconsideration of methods tried and found technically feasible in the past may show that they are economically applicable under present conditions. Breaker rupturing capacities must be increased greatly or systems must be developed with limited energy concentrations to faults, and every inducement is offered for an immediate decision on the ultimate possibilities of breakers.

Penny-Wise Public Relations

RECENTLY one of the state public utility information bureaus received a communication from an executive of a central-station company serving a community of about two hundred thousand people saying that he had decided to start an energetic campaign to build good will for his company. The executive was so thoroughly "sold" on the idea that he desired to employ a suitable man who could devote his entire time to the furtherance of public relations. In fact, he had studied that problem so carefully that he visualized the exact type of man he wanted and in his letter set forth the following specifications:

"A college graduate, preferably technical, between twenty-five and thirty years of age, married, with central-station experience, able to address meetings of business men, civic and women's clubs, write copy for good-will publicity and sales advertising; salary to be $1,800 per year."

Now, it is hard to believe that an executive of a public utility company operating in a city of the size mentioned would have so low an estimate of the value to his company of the services of a man capable of improving public relations. Any manager who expects for such a paltry sum to raise his company to a high plane of public approval, granting, of course, that his company suffers from ill will, is doomed to disappointment. Penurious, penny-wise, pound-foolish policies are just as uneconomical when it comes to good-will service as is the purchase of cheap generating equipment just because the initial cost is low. Anything worth while is worth paying for.

The Outlook for the Industrial Lighting Campaign

INDUSTRIAL lighting at present is far from being either adequate or efficient. This is evident in any casual survey by one who knows what good lighting is. The intensity of illumination is generally insufficient to bring good results. Glaring light sources are prevalent. The fact that fifty million incandescent lamps are used up per year in industrial lighting but that only five million "RLM" reflectors are as yet in use is significant. If these lamps operate on an average of about three hours per day, it is obvious that each socket requires about one new lamp per year. This means that 90 per cent of the sockets are not equipped with these reflectors, and this being the product of the most active group of manufacturers can be taken as a fair index to the present use of proper illumination, for it is safe to assume that no very large proportion of these are equipped with modern units of some other type. Even allowing for two lamps per socket per year, it is seen that many million sockets still remain to be supplied with proper lighting equipment. Besides this job there still remains that of increasing the wattage of the lamps used so that adequate as well as proper lighting shall be obtained.

So there is opportunity enough in this field of lighting to merit the attention of the industry and a serious effort to develop the market, and the campaign which is being organized by the special committee of the National Electric Light Association may expect hearty support. Virtually $100,000 has been subscribed by manufacturers interested in this field of activity, and the program of publicity and sales is being worked out under the direction of Chairman Joseph F. Becker. Just as in the recent home-lighting campaign, where the popular appeal was for the safeguarding of eyesight, this campaign has a broad purpose to which the men of the factories will undoubtedly respond, because improvement of industrial illumination reflects itself directly in a decreased cost of production which should exert an influence toward reduction in the cost of living and protection against foreign competition. The campaign will undoubtedly receive the enthusiastic support of all branches of the electrical industry.

An Opportunity for Profitable Business

SURVEYS and experience indicate that commercial cooking and baking by electricity has few equals as a builder of new business and that any electric light and power companies which have not gone after this load have made a mistake. At present there are about 190,000 restaurants, cafeterias, bakeries, hotels and similar institutions in the United States which could use electric cooking in some form or other. If all of them were to replace their fuel-fired equipment with electric appliances, the total electric load would amount to something over 3,000,000 kw., and the value of the electrical equipment involved would be more than $120,000,000.

Considering only ranges and ovens, the average restaurant or bakeshop would probably make at least 200 hours' use per per month of the average watt-hour demand, this figure probably reaching 500 hours per month in some cases. The chief power demand usually occurs in the early morning before the maximum lighting, industrial power or street-railway peaks and only to a less extent just before meals, because most commercial cooking is done early in the day and heat is required just before meals only to keep things hot or to prepare à la carte dishes. In large bread-baking establishments the load usually occurs soon after midnight and in small bakeshops early in the morning or late in the afternoon. Toasters, waffle irons and small appliances in kitchens produce intermittent loads between 6 a.m. and midnight with a resultant high diversity factor.

Owing to the fact that food preparation is a primary essential, the consumption of electricity by bakeries, restaurants and hotels is less affected by business

depressions than possibly any other type of central-station load with the possible exception of domestic lighting and street transportation. Thus this load has a permanence hardly to be equaled. If a customer's circuits or distribution conductors or transformers are loaded up to capacity, the addition of such a load will, of course, require additional service facilities. It has been found, however, that most of these installations very seldom require an increase in service facilities. When metered with all other power or with both power and light, as is done in some localities, no extra meters are required. The business is worth seeking. Some of the arguments used in obtaining it in Cleveland are presented elsewhere in this issue.

Separate Versus Common Grounds for Station Equipment

MOST utility companies provide lightning arresters with separate ground connections from other equipment, although the actual ground may be the same. In some cases the ground is provided by laying a mat of interconnected conductors under the foundation slab; in other cases heavy cast-iron grounds in multiple are used. The grounds are installed where moisture will be permanent or nearly so.

Question has been raised as to what trouble could come from having lightning-arrester ground conditions identical with the ground connections for other equipment. One answer which has been given is that during a surge through a lightning arrester the *IR* drop in the ground connection may be considerable. This, of course, depends on whether a network of grounding conductors of adequate size is provided or not.

Perhaps the engineer will have a new problem in calculating whether the ground conductors installed in stations or substations will have adequate carrying capacity under the largest current to which they will be subjected, so that they will constitute a safeguard instead of a liability. Those which have been installed in the stations of small and medium systems have probably been made large enough for mechanical reasons to make them adequate electrically, since no trouble has been reported. But it may be, in large stations or those connected with concentrated generating capacity, that the current-carrying capacity of ground connections deserves more serious consideration.

Objections to Merchandising a Challenge to Ingenuity

IN SOME territories where merchandising has not been attempted by the electric service company or where past attempts have not been successful there appears to be the attitude that merchandising should not be conducted by the company. This may be true where real initiative is being exercised by the majority of dealers, as in Cleveland under the stimulation of the Cleveland Electrical League. Elsewhere failure to merchandise is not in keeping with the general trend of utility companies to engage in it, this trend embracing many that once thought it inadvisable.

With them, as with many utilities still, the outstanding questions were: (1) Why do it when there is no money in it? (2) Why do it when it will antagonize existing dealers who go to make up public opinion? The answer to the first is to conduct the business on a business basis, taking a fair profit over the cost of operation. The answer to the second can be found first by ascertaining what the objections of dealers would be to merchandising by a utility, and then adopting a policy which will meet any sane objections.

Clean, aggressive competition never hurt any merchant who had a right to remain in business, and it usually stimulates the competitors to achieve greater success than they would otherwise. Coupled with the co-operation which a utility company could give other dealers, merchandising by the company should be a benefit to many dealers. Co-operative buying, avoidance of cut rates except upon agreement, and then only at a profit, joint advertising, utility assistance in planning campaigns, and so forth, will help get the support of progressive dealers. One utility company in embarking on a merchandising policy promised the co-operating dealers that if they did not do more business with the utility merchandising than they did before, the utility would sell out its business to them at cost.

It is advantageous to know possible objections to merchandising if they act, not as deterrents, but as a challenge to establish a harmonious policy. With the opportunities that utility merchandising offers for profit, load building and rendering a public service that dealers may not render, merchandising will not be cast aside by a progressive company until it has tried every means to overcome the obstacles.

Terminal Electrification Need Not Await Trunk-Line Electrification

IN ITS recent financial report the Chicago, Milwaukee & St. Paul Railway indicated that had it not been for the partial electrification of its road its showing would have been far below that reported. This speaks well for the economy of electric operation and should encourage electrification of other railroads which have equal or better traffic conditions. Although there are other trunk lines which conservative thinkers in the electric service field believe could be electrified economically, it will remain for these lines, and especially for manufacturers and utilities that might serve them, to aid in an economic study which will lead to the change to electricity.

Terminal electrification in congested centers, however, need not wait for trunk-line electrification. An advantage to which a fairly definite monetary value can be assigned has been to a great extent overlooked. It is the opportunity to capitalize on the building rights made possible by the change. The New York Central operation north of Grand Central Terminal, New York City, is a striking example. It has been reported that this railroad more than offset the entire cost of electrification to Harmon, N. Y., by the real-estate development over the electrified right-of-way. This result was obtained by overbuilding only that section from Forty-fifth Street to Ninety-sixth Street which now constitutes one of the most fashionable hotel and apartment-house sections in New York City.

Although railroads in other cities might not have such large opportunities to capitalize on overbuilding, a properly planned real-estate development would surely show a return handsome enough to justify terminal electrification in some congested cities. Electric service utilities and electrical manufacturers should be able to show these railroads the opportunities they have to capitalize on terminal electrification.

Michael I. Pupin

President-elect of the American Institute of Electrical Engineers

MICHAEL IDVORSKY PUPIN was born of Serbian parents in Idvor, Banat, Hungary, on October 14, 1858. He emigrated to the United States as a boy in 1874 and obtained manual employment. On the savings of five years he entered Columbia College, where he was graduated in 1883 with high honors. He took post-graduate work in physics and mathematics at the University of Cambridge, England, and the University of Berlin, Germany. In 1889 he returned to Columbia University and with the late Prof. F. B. Crocker started the electrical engineering department there, becoming instructor in mathematical physics. Professor Pupin has remained at Columbia ever since and now occupies the chair of electromechanics, besides being director of the Phoenix Research Laboratory of the university.

In recognition of his achievements in research Professor Pupin has received many honors. These include the Hébert prize in physics from the French Academy, an award made to him for his "method of mathematical analysis of electrical circuits, which is today recognized as classical," and for his "discoveries and inventions in electrical resonance, the tuning of electrical circuits and the loading of telephone lines." He also received the Carson gold medal from the Franklin Institute and (in 1921) the Edison medal, awarded to him by the A. I. E. E. "for work in mathematical physics and its application to the electrical transmission of intelligence." This award was largely a recognition of his discoveries in both the wired and the wireless communication field, chief among which in importance was his invention and application of the loading coil in connection with long-distance telephony. His early work in electrical resonance resulted in the use of tuned circuits for selective reception of signals, which has had a profound effect in extending the use of wireless.

A further refinement contributed to this art by Professor Pupin is the polarized electrolytic-cell method of rectifying both low-frequency and high-frequency oscillations to make them detectable by direct-current instruments. A more recent contribution has been the so-called negative resistance compensator. In 1917 he presented to the United States government the use of an invention by him decreasing static interference.

Dr. Pupin's autobiography, published a few years since, attracted wide attention in the reading world. He is a member of the American Academy of Arts and Sciences, the American Philosophical Society and the American Mathematical Society.

Testing 100,000 Meters Yearly

In the Alhambra Shops of the Southern California Edison Company Facilities Have Been Provided for the Testing of 100,000 Single-Phase and 7,500 Polyphase Meters Annually—Layout and Design Conducive to Efficiency

By W. R. FRAMPTON, G. E. DECKER and W. J. McCULLOUGH
Southern California Edison Company, Los Angeles, Cal.

IT IS fundamentally essential in the operation of any central station that due regard be given to the measurement of its output. The entire revenue of the company is affected in this process and the good will of the consumer depends upon its accuracy. In short, the integrating watt-hour meter is the connecting link between the public and the company, and it cannot do justice to either party unless it is given specialized attention and brought to a degree of accuracy that inspires the confidence of all parties concerned.

In the new Alhambra shops of the Southern California Edison Company the meter test division was well provided for. An effort was made in laying out and designing the meter section so that the work could be accomplished in the most efficient manner with as little confusion as possible, at the same time providing the most convenient and acceptable environment and working conditions for those engaged in this work. The department occupies a floor space of approximately 55 ft. square and is well lighted by an eastern exposure of 55 ft. from an equal expanse of skylight along its western side. Adequate artificial lighting facilities have been provided for dark days. A floor plan of the testing department is given in Fig. 1, while Fig. 2 is a general view of this section.

TEST BENCHES

The test boards are all constructed of 1-in. ebonite panels supported by pipe framework. They are uniform in size, being 6 ft. in length and 5 ft. 4 in. in height, over-all dimensions. The bench part of the boards are 40 in. high, making it convenient for the testman to stand and observe the meter undergoing the test, or be seated on a desk stool as he may prefer. The rotating element of the meter is approximately on the level of his eye in either case. These boards are of the company's own design and are particularly adapted to furnish the form of test and data which is required.

The test boards are placed two in a bank to give the department a symmetrical appearance and lend to the convenient and efficient handling of all instruments. The present equipment includes three test boards for single-phase meter testing. Each board provides a test panel for four testmen, two on each side, each having suitable double-throw switches and spring type contacts to expedite the testing of all types and makes of single-phase meters. There are three of these boards of four positions each. Testing facilities are thus provided for twelve testmen. Ten of these positions are provided with loading devices for meters up to and including 25 amp., and two positions have capacities for meters from 25 amp. to 100 amp. inclusive. It is estimated that with this equipment an annual production of 100,000 single-phase meters may be maintained.

The test boards for polyphase meters are four in number and are formed into two banks of two each. The over-all dimensions of these boards and their construction are quite similar to the single-phase boards except that each 6-ft. panel provides space for but one testman. On these boards fixed resistance loading is used, and any load may be obtained in ¼-amp. steps from ¼ amp. to 85¾ amp. with provision made for inserting external resistance should it be required. One bank of boards is fed with potential at 220 volts and by means of variable series and parallel connections on potential phase shifters they may be used at either 220 volts or 440 volts. The other bank is fed at 110 volts and in a like manner is available for testing at either 110 or 220 volts. It is thus apparent that two positions are available at 440 volts, two at 110 volts or four at 220 volts, thus providing quite a flexible range.

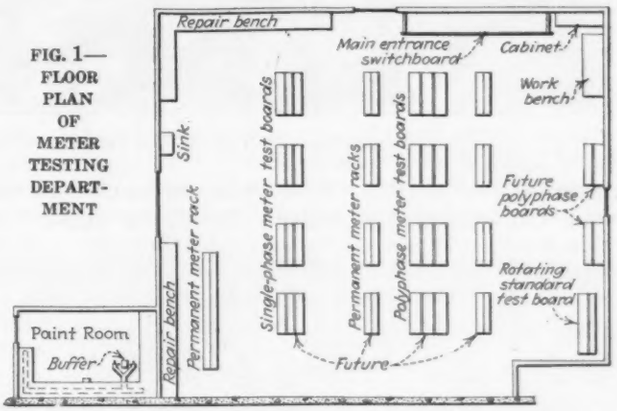


FIG. 1—FLOOR PLAN OF METER TESTING DEPARTMENT

The potential for the loading circuits on all meter test boards is 12 volts, the source of which will be detailed later. It is estimated that at present facilities are available for testing approximately 7,500 polyphase meters annually.

CALIBRATION OF ROTATING STANDARDS

One very important phase of meter testing is the calibration of rotating test meters both for use in the shop and for use in the field for routine and request testing. For this purpose a test board is provided similar in construction to the polyphase meter test boards except that it is 12 ft. in length. This extra length is required in order to provide all the necessary equipment. This board is supplied with three-phase energy at 12 volts for loading purposes and with 110-volt three-phase potential. Two potential phase shifters are used and may be connected to give any power factor at either 110, 220 or 440 volts. It is possible with this test board to check three polyphase meters or five single-phase meters at one time and at any desired power factor and load.

In addition to meter testing, it is also the function

of this department to make all acceptance tests for new relays and to repair and calibrate all relays which have been in service and which have been returned for stock or for repair. For this work a test board has been devised similar in construction to the polyphase test boards. It provides two testing positions for overload, directional or auxiliary relays and can be used as one unit for balance type relays. Energy is supplied to this board over six conductors, and they are used to feed any voltage of alternating current at either fifty- or sixty-cycle frequency or direct current as may be required. Banked with the relay test board is a board similar in over-all dimensions and type of construction, which is also fed by six conductors. This board is used for experimental purposes, and energy is supplied as it may be needed.

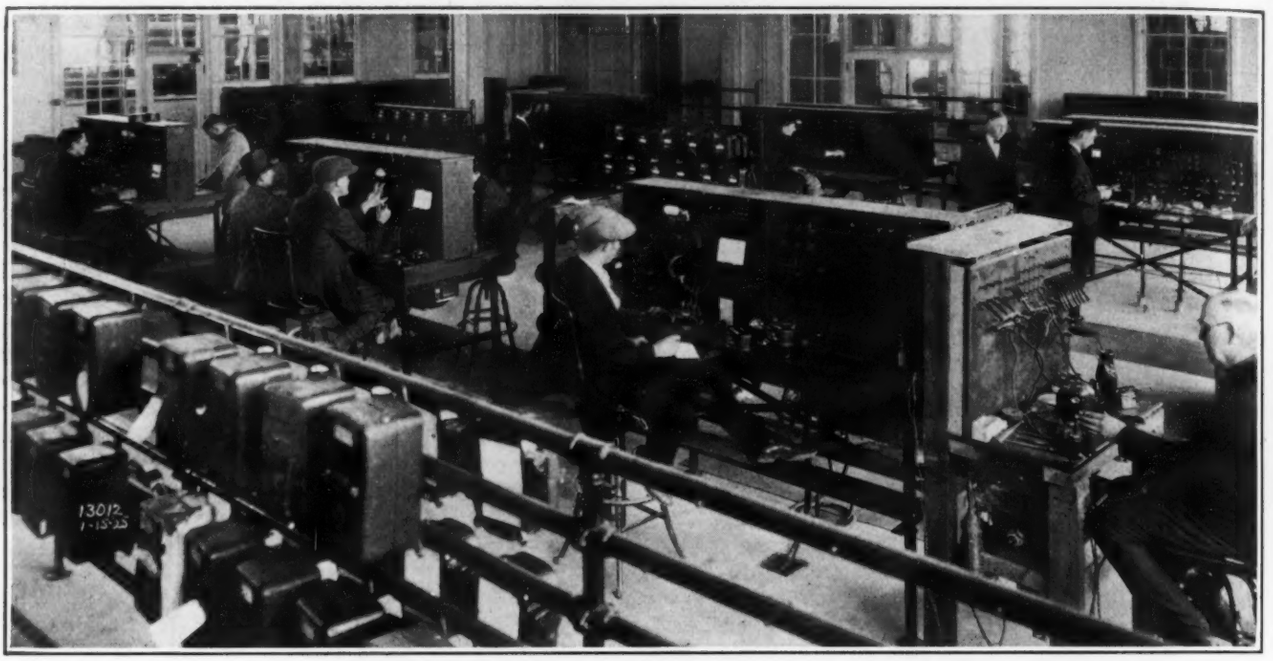


FIG. 2—GENERAL VIEW OF METER TESTING DEPARTMENT SHOWING MEN AT WORK AT TEST BENCHES

BENCHES FOR REPAIRS

Approximately 50 ft. of benches are available for the repair of damaged meters and relays. These benches are constructed with hard maple tops on pipe framework supports and are 3 ft. high, thus permitting the repairman to either stand at his work or be seated on a stool as he may desire. Soldering iron outlets, test circuits, gas burners and compressed air are available at each position. Vises, a power bench grinder and a power drill press are conveniently located when needed. It is estimated that approximately 15,000 instruments can be repaired annually with the present equipment.

CONTROL CIRCUITS

The control of the electrical circuits to the various test boards in the meter test department is centered in the main entrance plug board and switchboard. This board is constructed with 1-in. ebonite panels, supported by iron pipe framework. It is 5 ft. 4 in. in height to conform with the test boards and is 16 ft. in length. This board is permanently fed at 110 volts three phase and 220 volts three phase at fifty and sixty-cycle frequency. The fifty-cycle source is a bank of three 25-kva. transformers connected in closed delta and the sixty-cycle source is a separate bank of transformers similar in size and connection, both of which are controlled and located in the apparatus department.

In addition to this source of energy spare feeder circuits terminate at this main board, which may be used for any energy which is available at any place in the entire plant. Six of these spare conductors are fed from the apparatus department and six emanate from the laboratory section. The main entrance board of the meter test department is primarily divided into two parts, one section being fed with energy at sixty cycles and one at fifty cycles. Supported on pipe framework in the rear of each section of the board are three 5-kva., 220 to 12-volt loading transformers connected in closed delta. On the front of the board double-throw switches are provided for both current and potential, one position feeding sixty-cycle energy and the other position feeding fifty-cycle energy to any test board in the room. This source of energy to the various banks of test boards may be varied in any manner required, by means of plug receptacles and jumpers terminating on the face of the board. In a like manner the relay test board and the experimental board may be fed from this control board with any energy that is available in the entire plant, because of the spare feeders which have been mentioned.

The feeders from the main board radiate in a fan shape in conduits in the floor, where they terminate in outlets just below the various test boards. Spare conduits have been installed whereby it will be possible to increase the polyphase production 100 per cent and the single-phase production 50 per cent of the present estimates.

METER HANDLING AND MAINTENANCE

All instruments are conveyed to the department on rubber-tired movable racks. For single-phase meters each of these racks has a capacity of 50 meters and can

be rolled quietly about the room to a position convenient for the repairmen or testmen. The polyphase meters are handled in lots of twenty, and are hung on permanent racks constructed of pipe 6 ft. in length and 5 ft. 4 in. in height, which are located, one each, just in the rear of the polyphase testman.

All painting and cleaning of meters is done in a fireproof room 12 ft. x 20 ft. located immediately adjacent to the test room. The meters are cleaned by a self-contained 1-hp., 220-volt, three-phase motor driving a 10-in. wire buffing brush. Compressed air is used for painting and for giving each meter a company code number. The benches for this work are built along two sides of the room and have a metal hood above. Holes in the rear of the bench are connected to a self-contained exhaust fan driven by a 1-hp. motor, which carries away all obnoxious gases from the painting as well as all débris from the cleaning brush.

INSTRUMENT STORE ROOM

A floor space of approximately 1,500 sq.ft., located near the center of the test department building, has been set aside for the purpose of storing all test instruments and supplies. It is also the source of all repair parts, stationery and material necessary for carrying on the work of the test department. This location makes the section easy of access to all branches of the department.

All instruments, tools or supplies that may be necessary for any test are issued to any member of the department in exchange for a brass identification check, which is hung just below the space occupied by that article, thus making it possible to account for and locate, if necessary, any instrument at any time. All material of this nature is returned to the instrument room at the end of each week. Every man makes an effort to have his full quota of checks in his possession at least once a week. This process also prevents the retaining of tools and meters by the testmen when they are not in use.

New parts for instruments that are being repaired, and supplies for testing purposes are issued only on a form, signed by the supervisor immediately in charge of the work and by the man receiving the material. This receipt is used by the stock man to maintain a perpetual inventory record of all material, after which it is returned to the supervisor issuing it in order that he may check up the material being used in his work.

The test department laboratory is responsible for the accuracy of all instruments other than rotating test meters. All instruments are calibrated periodically and their absence from the instrument room is indicated by a special "laboratory department" check. All instruments either for repair or calibration are delivered to the laboratory. The supervisor of the meter test department is responsible for the accuracy of the rotating test meters and the system for handling the calibration and repair is identical with that used for other instruments.

All orders for new equipment and repair parts originate in the instrument store room and all shipments for the entire department are received here. This system facilitates the early delivery of all material to the person requiring it. Instruments sent to the test department from outside sources for repair or calibration are received at the instrument store room and in turn are delivered to the proper place for the work that is required. A log book covering the progress of this type of work, through the department, is kept here as a source of information.

Supplies that are flammable, such as gasoline, paints, etc., are kept in a concrete fireproof vault approximately 60 sq.ft. in cross-section and 10 ft. high, which is located in one corner of the store room. All other material is stored on shelves constructed around the sides of the room, with two sets of bulkhead shelving placed in the center of the floor space so that they are accessible from all sides. All supplies that are large and those that are infrequently used are kept in a separate room 12 ft. x 20 ft. adjacent to the main store room in the laboratory.

FIG. 3—METER STORAGE ROOM EQUIPPED WITH IRON PIPE RACK FOR HANGING METERS

Study of High-Tension Cable Joints

Regional Convention of Institute Brings Out Diversity of Engineering Opinion as to Value of Different Methods of Design and Testing—Careful Workmanship Vitally Necessary—Need of Exhaustive Research Conceded

HIGH-TENSION cable joints were vigorously discussed at the regional convention of the Northeastern District of the American Institute of Electrical Engineers at Swampscott, Mass., May 8, in connection with the presentation of a paper upon this important subject by E. W. Davis, assistant electrical engineer, and G. J. Crowdes of the engineering staff of the Simplex Wire & Cable Company, Boston. Disclaiming sufficient investigation to warrant conclusions, the authors presented data from experimental tests upon seven types of joints, four with 25-kv. cable and three with 33-kv. cable, and gave a comprehensive review of the designs and methods employed in attacking the problem of obtaining improved joints in face of the demands of the industry for higher-voltage cable applications. Comment upon the paper was voiced by A. P. Thoms, Commonwealth Edison Company, Chicago; Mario Puritz, Società Italiana Pirelli, Milan, Italy; F. A. Brownell, Public Service Electric Company, Newark, N. J.; A. H. Kehoe, United Electric Light & Power Company, New York, and Prof. C. A. Adams of the Harvard Engineering School, Cambridge, Mass., considerable difference of opinion developing as to the technique of joint design and testing. C. F. Hanson, Habirshaw Cable Company, Yonkers, N. Y., and L. A. Zima of the Brooklyn Edison Company submitted written discussions of certain phenomena in dielectric strength tests of cable splices.

DIELECTRIC LOSS AND STRENGTH

Dielectric loss tests were made by the authors on the cable, which was jointed according to various designs, and on the joints themselves. Ionization, dielectric strength and breakdown tests followed. Both sector and round conductors of 300,000-circ.mil size were employed. Dielectric loss tests were made in a heat box and dielectric strength tests at a room temperature of about 25 deg. C. The first joint used was of varnished cambric. The ionization point of the cable occurred at 20,000 volts to 25,000 volts and that of the joint at from 15,000 volts to 20,000 volts, and the ratio of three-phase dielectric loss of joint to cable varied from 4 to 1 at 25 deg. C. to 7 to 1 at 80 deg. The joint withstood a maximum of 100,000 volts in 500-volt steps and 75,000 volts for 180 minutes without evidence of burning. The second joint, of impregnated paper, had a lower dielectric loss than the varnished-cambric joint and a higher ionization point. The ratio of three-phase dielectric loss, joint to cable, ranged from 2.4 to 1 to 2.1 to 1. Breakdown occurred at 75,000 volts after 173 minutes' application.

The third joint was a paper-insulated "step" joint, with somewhat lower dielectric losses than the penciled paper joint. This failed at 85,000 volts, single-phase. The dielectric loss ratio, joint to cable, was 1.7 to 1. The fourth and last joint for 25-kv. cable was the so-called "Conducell" joint. Its dielectric loss ratio ranged from 1.7 to 1 to 2.9 to 1, being markedly greater at high temperatures. Very low dielectric strength was shown in the high potential tests, failure occurring at 75,000 volts after three minutes.

In the first 33,000-volt joint made up the ratio of dielectric loss in joint to cable was 1.32 to 1 at 25 deg. and 1.27 to 1 at 80. This was an impregnated-paper joint, and it failed at 150,000 volts applied twenty-six minutes after step applications of lower voltages. In the next joint the conductor insulation was reinforced from the cable crotch to the insulation over the copper sleeve. The dielectric loss was about as before. Flashover occurred at the end of twenty-six minutes with 160,000 volts, but no burning was observed and no internal discharges were heard. Finally, a so-called "undercut curtain" joint for 33,000 volts was made up, paper-insulated, with round conductors. The dielectric loss in three-phase watts per foot ranged from 0.25 at 25 deg. to 0.54 at 80 deg. The ratio of dielectric loss ranged from 1.30 to 1 at 40 deg. to 1.68 to 1 at 80 deg. The joint apparently failed at 150,000 volts after ten minutes' application.

Mr. Crowdes pointed out certain unexplained differences between the dielectric strength with round and sector conductors, the former having held in a typical case at 140,000 volts against 110,000 volts to 120,000 volts with the latter. Mr. Thoms maintained that the dielectric loss test constitutes the best known present test. He favored increasing the present standardized voltages applied in testing and declared that all dielectric tests should be made down to at least 5 deg. C. and not confined to room temperatures. Accelerated life tests should be at least two to two and one-half times the rated voltage. Joint and cable tests need greater co-ordination. Mr. Thoms called attention to the use of both single-phase and three-phase voltages in the authors' tests and was of the opinion that more care should be taken to listen for sounds of distress as the voltages are increased. With a long paper tube or a stethoscope closer determinations can be made.

DISCUSSION BY MARIO PURITZ

Mr. Puritz observed that the Pirelli three-phase joint with undercutting and tightened paper-roll joint is of the same type as the last 33,000-volt joint tested by the authors and has been used in Europe many years. A full description of this joint may, he said, be found in the London *Electrical Review* for August 10, 1923, and a further description with the latest improvements will be published in the report of the underground systems committee of the N. E. L. A., to be printed this year.

About two hundred of these joints for 35,000 volts have been installed in the last few months in Chicago and Boston. The test joints were all about of the same dimensions as those described by Mr. Davis, filled with soft compound and with the only difference that the lead sleeve was of smaller diameter and had a reservoir on the top. One joint was tested in three-phase, starting at 100 kv. and increasing 15 kv. every thirty seconds. At 200 kv. after five seconds flashover at pot-

head occurred. Voltage was lowered to 183 kv. After five minutes a failure in the pothead occurred, with no sign of failure or carbonization in the joint.

Four other joints of the same type were tested in single-phase, one conductor against the other two and the lead at the middle point. The voltage was applied starting at 120 kv. and increasing 10 kv. every thirty seconds. One joint failed at 190 kv. after twenty-one seconds because of moisture in the compound. The other three joints withstood the test potential of 200 kv. (the maximum pressure available) without evidence of trouble, and all failures occurred in the potheads as follows: After twenty minutes at 200 kv. for the first, after twenty minutes fifteen seconds for the second, and after twenty minutes five seconds for the third. No signs of carbonization were found in the joints.

Tests of the three conductors in parallel against ground were also made on three other joints with failures of the joints at pressure corresponding to 225,000, 242,000 and 225,000 volts delta.

In a long-time test run in single-phase, 100 kv., one phase against the other two and the lead at the middle point, another joint was perfectly intact after eighteen hours and eighteen minutes, when the cable failed at a bend owing to the excessive increase of temperature of the dielectric. After this test some leaf-shaped carbonizations were found on the conductors all along the cable and in the joint. The carbonizations showed on about fifteen of the outside layers of the conductors, owing especially to the single-phase test, but the carbonizations in the joint were not so deep as carbonizations on the cable.

The cables on which the test joints were made were either 3 × 350,000-circ.mil or 3 × 300,000-circ.mil, 35,000-volt round conductor, 8 × $\frac{8}{64}$-in. insulation, $\frac{1}{8}$-in. lead and 3-in. over-all diameter.

Discussion by F. A. Brownell

Mr. Brownell, continuing the discussion of the paper, said: "The authors say that among the essential properties of a good joint are low dielectric loss and then experiment with materials that give them the greatest loss. We are then led to believe from the tests, which showed high dielectric strength, that we can make a good joint with this material.

"The authors touched upon a vital point when they stated that extreme care should be used in assembling the joint. We believe that is at least 50 per cent of the battle and that the remainder lies in the right combination of materials entering into the joint. From our experience with the right combination of low dielectric loss materials, we have found that the joint under stress is cooler than the cable. No actual temperature data are at hand, but in one case after thirteen hours at a voltage of 105,000 the cable and joint were examined, and while the cable was actually hot, the joint was slightly higher than room temperature.

"If the theory of graded insulation is sound, we are not following out its principles, for in wrapping varnished cambric with a higher specific inductive capacity than the paper upon which it is wrapped we place a higher stress upon the penciled surface. By plotting voltage gradient curves using a specific inductive capacity of 3.5 for paper and 4.5 for varnished cambric and taking a point $\frac{1}{8}$ in. back on the penciled surface of the paper one gets a voltage gradient of 12 kv. per centimeter more than if paper only had been used.

"We made up two single-conductor joints with stepped insulation and with the same thickness of insulation in each case. One joint was wrapped with varnished cambric and paper was used in the second. Failure in each case was at 190 kv., and in both cases the surface of the stepped insulation was badly burned and we were at a loss to know whether this was due to reverse grading in one case, and in the other whether voids had been left owing to the fact that it is virtually impossible to obtain a tight-wrapped joint by use of paper. The one advantage in the use of varnished cambric is that it is possible to get a tighter-wrapped joint.

Stepped Joints Give High Breakdown

"We made up two joints that were very similar in design to the authors' joint No. 3, with the difference that we used a special material for wrapping over the connector to a level of the factory insulation and then wrapped paper over this, giving the same thickness of insulation as in joint No. 3. The tests on these joints are as follows: 100 kv., four hours; 120 kv., two hours forty-five minutes, failure in crotch of joint. On the second joint we held 80 kv. for four hours and raised the voltage 10 kv. each hour. After thirteen minutes at 130 kv. failure occurred in the end bell. This was repaired and voltage rapidly applied, when failure occurred at the same place at 160 kv. The ends were again cut back and failure occurred again in the end bell at 166 kv. While the second joint did not fail, it showed signs of high stressing. The surface of one conductor at the edge of the belt was charred, and the petrolatum had changed in color with particles of carbon throughout. In neither joint were there any signs of charring along the surface of the stepped insulation.

"Our experience has been that we could get higher breakdowns with a stepped joint, and we have found that the average cable splicer will make a better and more uniform job than can be obtained with penciled insulation. We have examined joints that have been in service for a number of years and found that where they had been penciled the splicers took three or four slashes with a knife, called it a job and in consequence left a very uneven surface to tape over.

"Comparing the first of the 33-kv. joints with the second: In the first joint the failure and signs of distress near the edge of the belt were plainly due to the tangential stresses at this point. In the second joint the insulation was extended back to the crotch, and as this joint did not fail, we are led to believe that this is due to the added insulation of the conductors. I cannot conceive of overcoming tangential stresses by adding more insulation, but would rather use an electrostatic shield to overcome the tangential stresses and smooth out the voltage gradient at the edge of the lead sheath. By using this and some slight refinements we have developed a joint that apparently is stronger than the cable.

"In the final joint the use of the Cleveland idea of undercutting the insulation and extending the connector to a level of the factory insulation is no doubt a good one, but limited to round conductors. From our observation of splicing cable in the field we could not conceive of using a paper roll on three-conductor cables, for it is seldom that the three conductors can be brought out on a plane and a tight wrapping cannot be obtained.

"As the authors have not drawn any conclusions from their experiments we are tempted to draw the following for them: That in the case of the varnished-cambric wrapping and the joint filled with a hard asphaltum compound the dielectric strength on short-time breakdown is high, but on life tests at high potential a well-wrapped paper joint filled with petrolatum will give a higher breakdown. This is perhaps accounted for by lower dielectric loss.

"To sum up the impressions we have gained by our experimental work, we have concluded that for a 33-kv. joint the material entering into its construction should approximate the characteristics of the materials in the cable and that we cannot get a tight-wrapped joint by impregnated paper. We have substituted a material with the same characteristics but one that is more pliable. Tangential stresses at the termination of the lead sheath should be taken into consideration. We believe that this can be overcome by the use of static shields or the proper slope of the lead sleeve. To get a well-filled joint it must be filled under pressure, and last, which should come first, is the education of the splicer in the proper manner of assembling the joint.

"The only apparent objection to the use of petrolatum in filling joints is the migration of the oil from the joint, and this we believe can be overcome to some extent by using a petrolatum with a higher viscosity than is used at present, still retaining approximately the same dielectric strength."

DISCUSSION BY L. A. ZIMA

In his discussion of the Davis and Crowdes paper on high-tension cable joints, L. A. Zima, electrical engineer's department, Brooklyn Edison Company, said:

"The authors start out with an assumption of 'suitable cable.' This is a broad assumption to make for high-voltage cable, considering our limited operating experience to date. They further state that high-voltage cable jointing must receive considerable attention in the near future. Perhaps from the manufacturer's standpoint this is correct, but the cable user has given a great deal of attention to this problem ever since high-voltage cable has been manufactured and has had reasonable success. This success is based on long practical experience following tedious research work on experimental joints. Work along this line has been somewhat retarded waiting for the cable manufacturers to make suitable cable.

"I rather question the three essential properties mentioned. Simplicity of design is certainly to be desired, but it is not an essential property. High dielectric strength is desirable, but this does not necessarily mean very high instantaneous breakdown voltages or on short life test. It is possible to make up a joint to give very high dielectric strength on instantaneous voltage application but which will fail utterly to give satisfactory results in normal operation. Dielectric loss as low as that of the cable is not an essential property of a cable joint. Owing to the large radiating surface of the joint and the large volume of surrounding air in the manhole, the cable joint is at a much lower temperature than the cable inside the duct line.

"The essential properties and requirements of a satisfactory cable joint are as follows:

"1. Proper design, keeping the voltage gradient of all points in the joint within proper limits.

"2. Materials of good quality, having high dielectric strength, with an 'S.I.C.' of relatively the same value as that of the cable. These should not vary in normal operation.

"3. Workmanship of the highest order.

"The voltage tests made on the various joints were of comparatively short duration. Lower values and longer time would be more desirable and would more nearly approximate service conditions. My attention is particularly directed to the electrical characteristics of the 'Conducell' joint. Of the seven types of joints, the authors find this one to be the poorest of the lot, as it has the lowest dielectric breakdown value. The reason for this, it seems to me, is not because of the design, but rather the general method of construction, especially the workmanship. The materials were not properly assembled and the filling was probably faulty.

TEST OF THREE-CONDUCTOR, 350,000-CIRC. MIL, 20 x 10 ÷ 64 PAPER INSULATION, ⅝-IN. LEAD

Joint No.	Kilovolts Between Phases—Three-Phase Test, 60 Cycle 50.0 Hrs.	70 Hr.	80 Hr.	90 Hr.	100 Hr.	110 Hr.	120 Hrs.	Total Time of Test, Hours
1	405	1	1	1	1	1	3 1/12	413 1/12
2	405	1	1	1	1	1	6 5/12	11 5/12
3	405	1	1	1	1	1	6 5/12	11 5/12
4	405	1	1	1	1	1	7 2/12	12 2/12
5	405	1	1	1	1	1	7 9/12	12 9/12
6	405	1	1	1	1	1	5 4/12	10 4/12
7	405	1	1	1	1	1	4 4/12	9 4/12
8	405	1	1	1	1	1	5	10

"There are a very large number of the 'Conducell' joints in operation and giving satisfactory service. This joint, if properly assembled, using good material, with high-grade workmanship, will give a dielectric breakdown test value, and instantaneous and accelerative life, equal to that of the cable. The Brooklyn Edison Company has had a large number of these joints in service more than a year, probably about two thousand five hundred to three thousand, and the operating results have been satisfactory. Refinements on these joints have continued, slight changes being made in the construction and the weakest points strengthened. The splicer is properly trained for this type of joint, and close supervision is maintained to insure high-grade workmanship. A number of joints constructed with these refinements are now under test. The result from the first eight joints is given in the table.

"The failures occurred at 120,000 volts after a number of hours as stated above. Examination showed the following: Breakdown between conductors at sharp bend in conductor insulation near cable crotch; failure between conductors at porcelain spacer due to jamming and breaking conductor insulation; breakdown at edge of belt insulation due to sharp bend in conductor insulation; a number of failures in cable crotch of the prepared cable ends.

"These tests are a fair measure of the dielectric breakdown voltage values of the cable joint on a long-life test at comparatively high values. Experience has demonstrated the value of long accelerative life tests to determine satisfactory cable, and the same thing holds true for cable joints. These tests should be supplemented by similar tests using direct-current instead of alternating-current voltage."

Mr. Kehoe contended that satisfactory system operation does not depend primarily upon the joints. Duct temperatures exceed manhole temperatures, and dielectric loss in the joint is hardly a practical problem today. Ease of obtaining uniform workmanship is of prime importance. Short joints are designed for structural accommodation. Simplicity of design and the ability to eliminate voids are important.

Accounting Service as an Executive Aid

By Charles L. Edgar

President Edison Electric Illuminating Company of Boston

FOR many years the specialized work of the N. E. L. A. has been carried on by three sections: Technical, Commercial and Accounting. This is, of course, in addition to the more recent Public Relations Section and to the general work of the organization. It is of interest to discuss in this connection the work done through these sections and their relation to executive management, not for the purpose of determining which section is most important, but in order to clarify the directions in which the executive shall exert himself and to emphasize the sources from which he gets information and inspiration in order to carry on company work.

CHARLES L. EDGAR

Let us assume that the executive of a company is chosen in the beginning from a walk of life entirely different from that of the electrical industry, with no personal knowledge of or experience with either the engineering, the selling, the accounting or the statistical work of a central-station company. What would be the first impression of such an executive?

I believe his first thought would naturally turn toward the technical division, having in charge the construction work. This is the department of a company which creates, and so it has a sort of glamour about it which immediately excites the interest of any one who has had no experience in that line of work. With the foregoing type of executive the construction work itself is carried along with very little reference to him or to his activities. It is more or less a self-sustaining organization and in a sense has no special value to the executive in helping him to solve his problems, nor has the executive, on the contrary, any special value to the construction organization to help it solve its problems.

The next to claim the executive's attention is the commercial department. This department also in a sense creates, not structures of visible things, but earnings, and earnings after all are the real backbone of the industry. Here again an executive having no previous knowledge of the selling industry has very little in common with the department. It is of comparatively little use to him in carrying out his work, and, on the other hand, he can be of little assistance to it in the carrying out of its own program.

This brings him to the last division, the accounting, and this is, in fact, the last to attract his attention. It is of the least apparent interest to him, as it seems on the face of things to be engaged in a work which is purely routine and which does not result in anything tangible.

An executive of the type described comes to his work without any preconceived ideas. He sits down at his desk and really starts in on his job. The first thing he discovers is that while he is interested in watching the construction work on the one hand and in getting reports from the sales department on the other he cannot actually get started on any phase of his own work without calling in the accounting department, and especially the statistical end thereof. He soon finds that it is this department which tells him what to do and shows him how to do it; that while the sales department and the construction department are of great interest, the accounting department is the real power behind his work.

Instead of being merely a routine department which accomplishes little or nothing, the executive finds in the last analysis that it is the only department with which he really comes in close contact. Actually, there is no real dividing line between the accounting and the executive departments of a company. One merges into the other in innumerable ways.

Possibly the average executive does not fully appreciate the fact that he is absolutely dependent upon the accounting and statistical information which is given him and which is at his disposal in order to determine upon any program which he may be intending to carry out; in fact, in many cases the program itself originates in the mind of the statistician.

All this is exemplified in our own organization in a very definite way. Personally, I am intensely interested in the construction work. I discuss it with our engineers and make suggestions, some good and some bad, and follow what is being done in considerable detail; but back of it all I have a feeling that they are the principals in the work which they are "carrying on" and that I am merely a looker on. Very much the same conditions exist in connection with the commercial work. I realize that upon the success of this work

depends the success of the company. I follow its ups and downs with great interest and have numerous consultations with respect to rates, methods, etc., but here again I have a sort of feeling that the men of the commercial department carry on their work more or less as a separate entity and that I am again more or less of an onlooker.

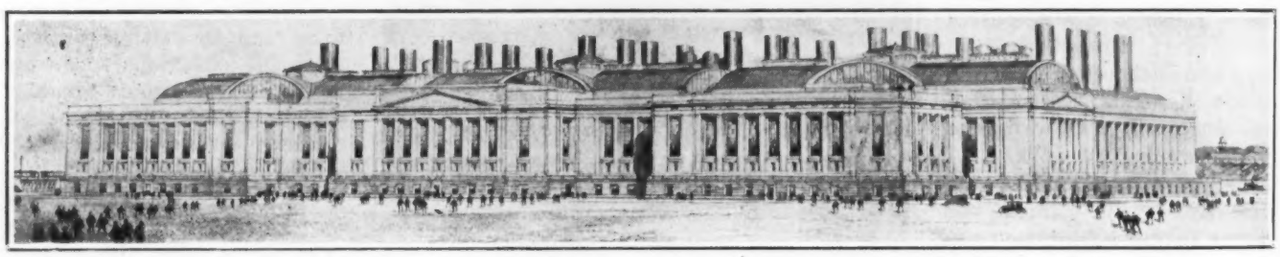
When I come to the accounting, and especially to the statistical, work, the story is an entirely different one. While it is still true that in the beginning the routine accounting work attracted my attention to a very slight degree, I became with time more and more cognizant of the part which it plays in our organization. There is scarcely an hour when I am at my desk that I am not asking questions or getting information from that department. Its work is really my work, and virtually I never make a move without, figuratively speaking, having some one from that organization at my elbow.

I have an idea that my experience is not unusual and that the average executive has about the same general relations to these three general departments that I have. If I were asked today to recommend some one to become chief executive of a company like ours, I should try to find a man, first, who, in addition to his ordinary executive qualifications, has what I call an accounting mind. He need not necessarily be an accountant by training, but he should be a man who, as I have often put it, thinks in figures. His management of a company might not be as spectacular as if he were an engineer or a commercial man, but I have a feeling that from the standpoint of the stockholders he would be a much safer man to have at the helm because of his having this so-called accounting mind.

In my belief the accountants are more in line for executive positions in their respective companies than if they were connected with any other branch.

Philadelphia's New Station

Richmond Plant of Philadelphia Electric Company Is Designed for Initial Capacity of 100,000 Kw.—Arrangement and Design Features of Steam and Electrical Equipment—Ultimate Plant to Be in Three Sections



THE ULTIMATE RICHMOND STATION, FROM ARCHITECT'S DRAWING

EXCELLENT progress is being made on the construction of the first section of the mammoth Richmond generating station of the Philadelphia Electric Company on the Delaware River, at the foot of Lewis Street, in the northeastern section of Philadelphia. The ultimate capacity of this plant will be 600,000 kw., the initial installation being 100,000 kw., and because of its size a number of interesting problems were encountered in designing it.

The details of the layout were naturally influenced by two primary factors—continuity of service and economy of operation. To prevent accidents in one section of the plant interfering with operations in the other sections, it was early decided that the plant should be constructed in three separate sections, each of 200,000 kw. capacity. These sections are to be connected electrically, but, as far as buildings and equipment are concerned, will be entirely independent. Each turbine hall (about 300 ft. x 150 ft.) will contain four 62,500-kva. turbo-generators.

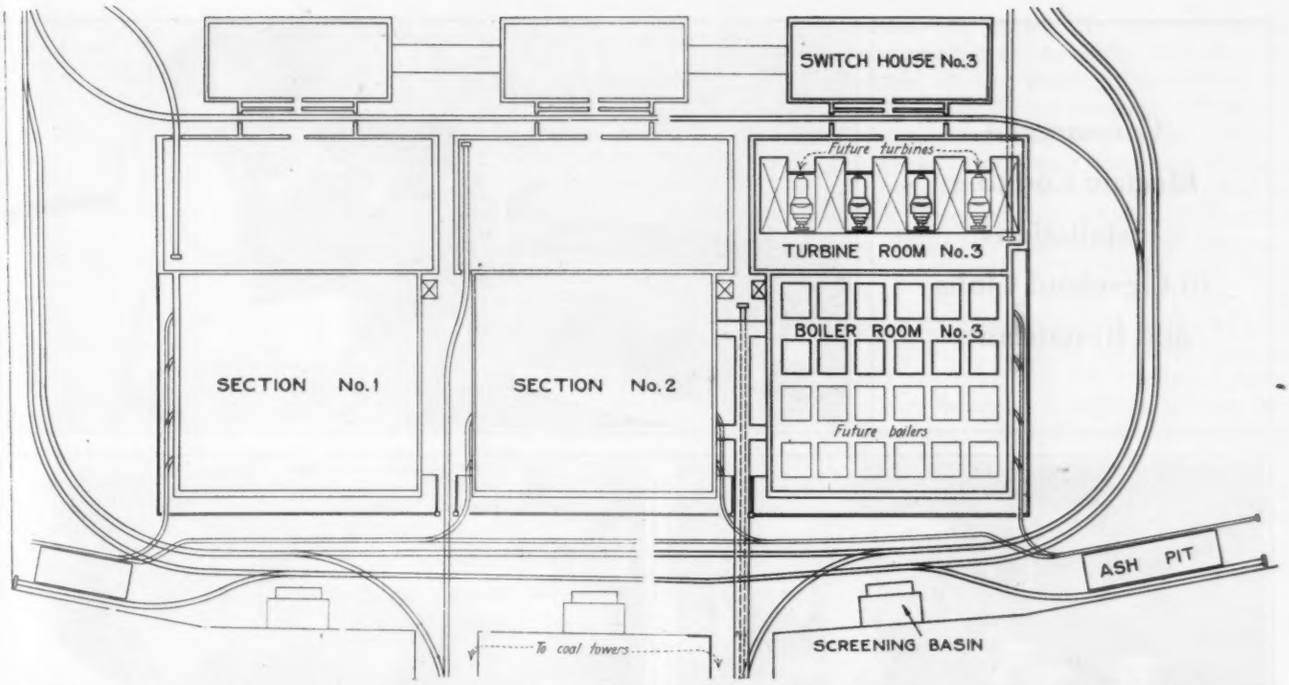
The property on which the plant is situated covers an area of approximately 63 acres, with a river frontage of more than 3,000 ft. The station itself is being built on a plot of irregular shape, covering 31.4 acres and having a river frontage of 1,520 ft., on which the buildings are to be placed as shown on the plan. Adjacent to this are 32.5 additional acres, with a river frontage of 1,588 ft., eventually to be used for coal storage.

In front of the main station buildings there will be two smaller buildings, one of which will be an administration building, containing the offices of the operating and technical staff of the plant and including a lecture room, library and club room. In the other will be laboratories, a locker room and a garage.

It is expected that the first two 62,500-kva. turbo-generators will be in operation toward the end of 1925. The buildings are to be constructed entirely of steel and reinforced concrete. The interior concrete surfaces are to be rubbed and painted, no brick or other facing being provided. The buildings and major equipment composing the initial installation are indicated by heavy lines, while those projected for future additions are shown by the lighter lines.

Opposite each of the spaces between boiler houses there will extend into the river a pier carrying two coal hoists, shown herewith in elevation. Sufficient coal (about 5,000 tons per day) can be delivered by two of the four hoists to operate the entire station. From each hoist a belt conveyor will run to the space between the boiler houses. The two conveyors entering from each pier will be housed in separate fireproof passageways and will be arranged so that either main conveyor can feed either of the cross-conveyors extending over the bunkers. The bunker capacity will be sufficient to operate the station at normal rate for about two days.

The boiler units, of which there will be six for each



RICHMOND STATION IS DIVIDED INTO THREE SECTIONS CONNECTED ON ELECTRICAL SIDE ONLY TO LOCALIZE ACCIDENTS TO UNITS

50,000-kw. turbine, or a total of twelve for the initial installation, are of the Stirling type, rated at 1,570 hp. each. Back of the boiler and built into the same setting with it will be, first, a two-drum steel tube economizer having 7,515 sq.ft. of heating surface and, next, a tubular air preheater with 22,000 sq.ft.

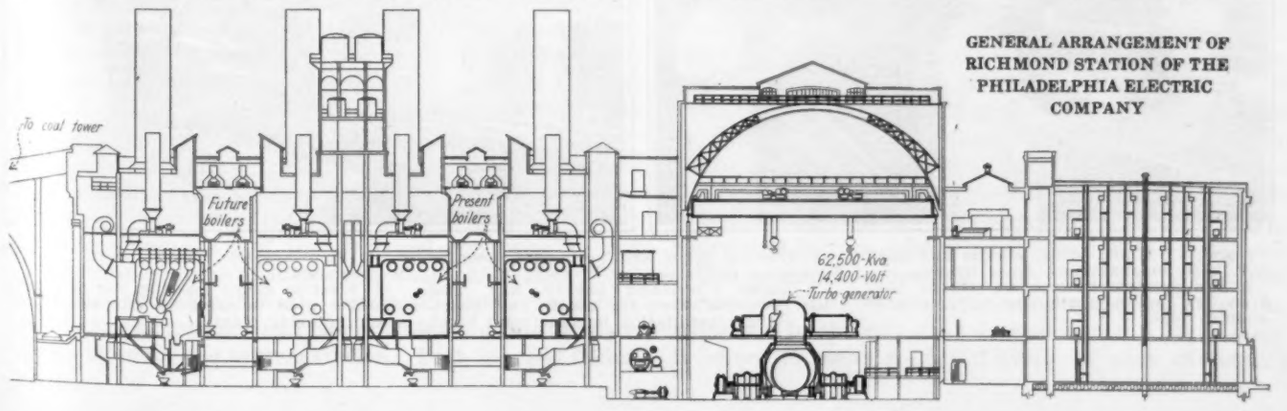
A special design of water-cooled furnace wall has been developed, consisting of cast-iron blocks faced with refractory material so graded that the maximum temperature consistent with the fusing temperature of the ash can be maintained in the furnace. These blocks are supported by boiler tubes, through which the boiler water is circulated. This construction will be used for the entire rear wall and the lower half of each side wall. The unit-design scheme will be followed in the draft equipment, the one forced-draft and two induced-draft fans provided for each boiler being installed directly above it. The stokers are of the underfeed type, each having fifteen retorts and twenty-seven tuyères.

The normal steam conditions selected are (at the turbine throttle) 375 lb. per square inch gage and 675 deg. F. At maximum loadings the pressure at the boiler outlet will be about 400 lb. and the temperature 720 deg.

The turbo-generators will be 50,000-kw. units, 1,800 r.p.m.—the largest ever built for this speed. The generators will be rated at 62,500 kva., 14,400 volts, 80 per cent power factor, three-phase, 60 cycles. Two external fans will be required to supply cooling air to each generator. The shaft-end exciters will be rated at 250 kw., 250 volts.

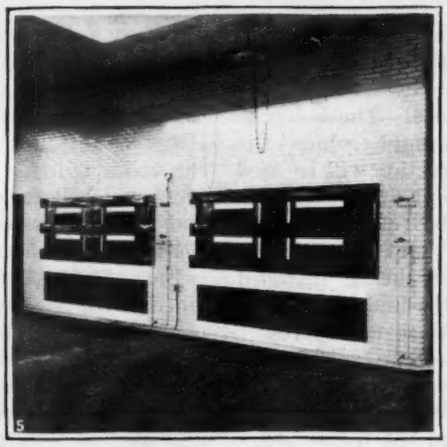
The turbines are being constructed for four-stage steam extraction. The three lower stages are to be used for feed-water heating and the fourth stage for auxiliary feed-water heating and for building heating. The first-stage heater is to operate at low pressure, the condensate being pumped directly from the hot well to this heater and into the heater de-aërator, which constitutes the second-stage heater. From the de-aërator the water will fall by gravity to the boiler-feed pumps, from which it will pass through the third-stage heater and through the evaporator condenser before reaching the boiler-feed headers.

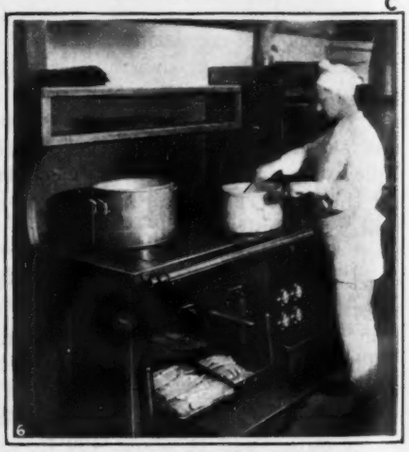
Each 70,000-sq.ft. surface condenser is to be provided with two circulating pumps, two condensate pumps, one steam ejector and one hydraulic air-removal pump. The water for condensing purposes is to be drawn through screening basins directly in front of each station section and carried through concrete tunnels at low velocity to the circulating pumps. After passing through the condensers it will be discharged into the river at the ends of the coal piers. The separation of about 500 ft. between the intake and discharge points will be sufficient to prevent any mate-



GENERAL ARRANGEMENT OF RICHMOND STATION OF THE PHILADELPHIA ELECTRIC COMPANY

Commercial Electric Cooking Installations in Cleveland Clubs and Restaurants





1 and 4. Waffle irons, griddle and bake oven used in apartment hotel kitchen.

2. Two electric ranges, an electric bake oven and small appliances in a popular country club.

3. Electric range and oven equipment in Cleveland cafeteria.

5. Large Cleveland bakery has used this 1,200-loaf oven for nearly two years.

6. Range installation in apartment hotel.

7. Two electric bake ovens used in women's club.

8. Electric range cooking top and meat roasting oven in cafeteria kitchen of large manufacturing plant.

rial temperature rise in the intake water due to recirculation.

All of the pumps in the plant will normally be motor-operated. One pump for each of the plant systems, however, will be provided with turbine drive for emergency use only. In the boiler-feed system three pumps are to be installed for each turbo-generator, any one being sufficient to handle full load on the turbo-generator. One pump in each of these sets of three is to be turbine-driven for emergency operation only.

The switch house, of the vertical isolated-phase type, will have provision for the generator sections, with 5 per cent reactors in series; for outgoing 13,200-volt lines, each rated at 6,000 kva. and having 3 per cent reactors, and for sections to supply an outdoor substation stepping up to 66 kv. It is planned to transmit a considerable portion of the energy from this station underground at 66 kv., and an outdoor substation of sufficient capacity will be built on the station property. The first installation of high-voltage single-conductor cables will be in operation this year.

The station auxiliary system will be supplied from two groups of transformer banks. In the first group the banks will be connected to the leads of each generator for the supply of the essential auxiliaries of that generator. The 2,300-volt secondaries will supply unit buses to which condenser auxiliaries, generator fans and boiler feed pumps of each unit will be connected.

In the second group the banks will be connected to the main 13,200-volt buses for supplying non-essential auxiliaries. The 2,300-volt secondaries will be connected to a double sectionalized 2,300-volt bus, from which all the boiler fans and other auxiliaries not directly associated with the individual units will be supplied. These include, in addition to several pumps, three 200-kw. motor-generator sets for supplying direct current to drive stoker motors. A storage battery will supplement this direct-current supply, also insuring the maintenance of lighting in case of shutdown.

There will also be transformer banks for stepping down to a 120/240-volt, two-phase, five-wire system for small motors and lighting. To provide for starting the plant from complete shutdown, a 3,300-kva., 2,300-volt reserve house turbine is provided.

Commercial Electric Cooking Gains

Arguments of Cleveland Electric Illuminating Company Convince Prospects that It Produces Better Food, Is Cleaner and More Dependable than Other Fuel, Reduces Labor Turnover and Is Economical

THERE are about 190,000 restaurants, hotels, clubs and bakeries in the United States that could use electric cooking. If all of these were to replace their fuel-fired equipment with electrical appliances, their patrons would be better fed, their managements would be more popular and prosperous, and the electrical industry would benefit commensurately from the increased use of electricity and of electrical equipment. It is conservatively estimated that to electrify these restaurants would call for $120,000,000 worth of electrical equipment and create a load of 3,000,000 kw.

The business of feeding the public is a much older institution than the electrical industry—centuries and centuries older—hence it devolves upon those in the electrical industry, particularly central-station commercial men, to show the whys and wherefores of electrical appliances for successful cooking. The field is large; of the 190,000 American cuisines, probably less than 8,000 are electrified.

In the city of Cleveland alone, with approximately 950,000 population, the Cleveland Electric Illuminating Company has found that there are more than 1,000 prospects for commercial electric-cooking equipment. In Cleveland, however, largely as the result of the promotional work done by the central-station company during the past two years, 7 per cent of all prospects already are using electricity in their kitchens, compared with 4 per cent for the entire country.

Close observation of the electrical apparatus in use in Cleveland commercial kitchens shows that electrification has proved uniformly successful from the standpoint of the customer and has provided a desirable class of business for the central station. Both the load factor and the power factor are highly satisfactory. The cost of promoting this use of electricity, however, must be compared with the cost of other types of pioneering work, but this cost becomes lower as satisfied users advertise and sell the idea of electrification to others that are interested.

The sole interest of the Cleveland Electric Illuminating Company in the electrification of commercial kitchens is in creating a larger demand for electricity. The company does not engage in selling electrical appliances of any sort, but it has set up in its power sales division a consulting engineering service that holds the confidence of the company's customers. The purpose of this service is to enable every customer to obtain the most efficient use of electricity, with the thought that this will be reflected later in his profits and development, so that his use of electricity will become more and more extensive.

Before approaching prospects the company analyzed the market, classified its possibilities, studied the prospects' requirements, and then started educational work. In addition to personal calls on hotel men, restaurateurs, club stewards and men and women in similar capacities, engineers of the company have addressed representative gatherings of those engaged in catering to the public appetite. The company has also prepared a booklet on commercial cooking, setting forth its advantages and illustrated with action pictures of successful electrified cuisines in Cleveland. This booklet is sent to prospects, delivery of each booklet being followed by a personal call.

The company is bending every energy to give a real service to the hotels, restaurants, clubs and other institutions in the city that do cooking on a large scale. It offers to make a special study of each customer's

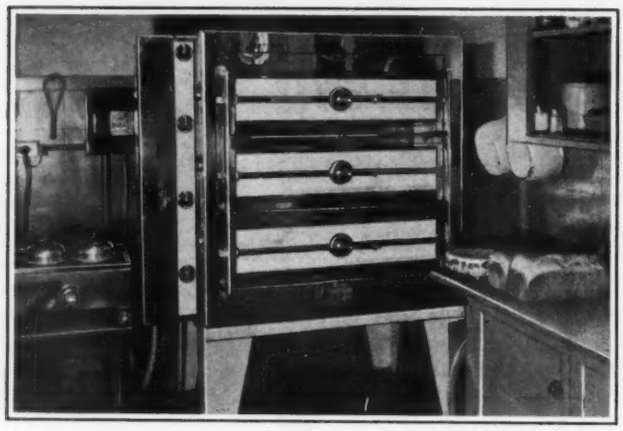
requirements, and to advise him as to what applications would prove of the most value. It endeavors not only to inform its customers as to what appliances they could install with greatest advantage to themselves, but also to safeguard them against unwarranted enthusiasm which might lead them to invest in appliances beyond their necessities.

Often it has been found advantageous to advise the customer to begin with one or more small appliances. Because "the proof of the pudding is in the eating," the success of these small appliances has in itself moved the customer to increase his electrical equipment.

SUPERIORITY OF ELECTRIC COOKING

The Cleveland company has been asked how, for example, it presents the advantages of electrical cooking to a hotel manager. Arguments may be presented in the following order of importance:

(1) Quality of food and saving of waste; (2) cleanliness; (3) dependability of heat supply; (4) permanency of equipment; (5) reduction of fire and explosion hazard; (6) comfort and satisfaction of help; (7) saving in equipment and space required, and flexibility of location; (8) cost of operation.



ELECTRIC OVEN USED IN COUNTRY CLUB

Quality of Food and Saving of Waste — Any one operating a hotel is interested in maintaining and developing patronage. A dining room or restaurant is made most attractive to its patrons by the superior quality of food, cleanliness and service. Each of these is affected by the source of heat used in cooking, but quality of food is affected most. It is not claimed that evenly broiled steaks or chops, delicious pastries or golden brown waffles and toast cannot be produced with any of the fuels that have been used for centuries; but neither was it impossible for people to travel before railroads or automobiles came into use. What railroads and automobiles have done for transportation, electricity is doing for commercial cooking.

What produces food of first quality? Consider the cooking top of an electric range. If all the heating elements are put on high, medium or low heat, every square inch of the cooking surface will be at practically the same temperature. There will be neither "hot spots" nor "cold spots." However, if it be so desired, different temperatures can be obtained at different points on the top by the turn of a switch. In the electric bake oven there is individual heat control on every deck (consequently no waste of space) and direct heat, which eliminates circulating air currents and gives even deck temperature. These features make for better, more uniform bread and pastries.

By the use of electric ovens the shrinkage of meats during roasting can be materially reduced, due to the fact that there are no circulating air currents to carry away the moisture in the meats. This saving in shrinkage, depending on the kind of meat and the fat content, amounts to from 5 to 20 per cent of the total weight of the meat.

The electric waffle iron is quick, efficient and clean, baking both sides of the waffle at once without flame or smoke. Electric toasters have the same characteristics, in addition to which they have automatic devices for turning off the heat when the toast is done.

Cleanliness—In the electric kitchen there is a noticeable absence of soot, dirt and ashes. There is no oily residue on the walls and ceilings from products of combustion. The food and dishes can be kept clean more easily. With no gaseous products of combustion, obnoxious odors in the kitchen and dining room are unlikely to exist.

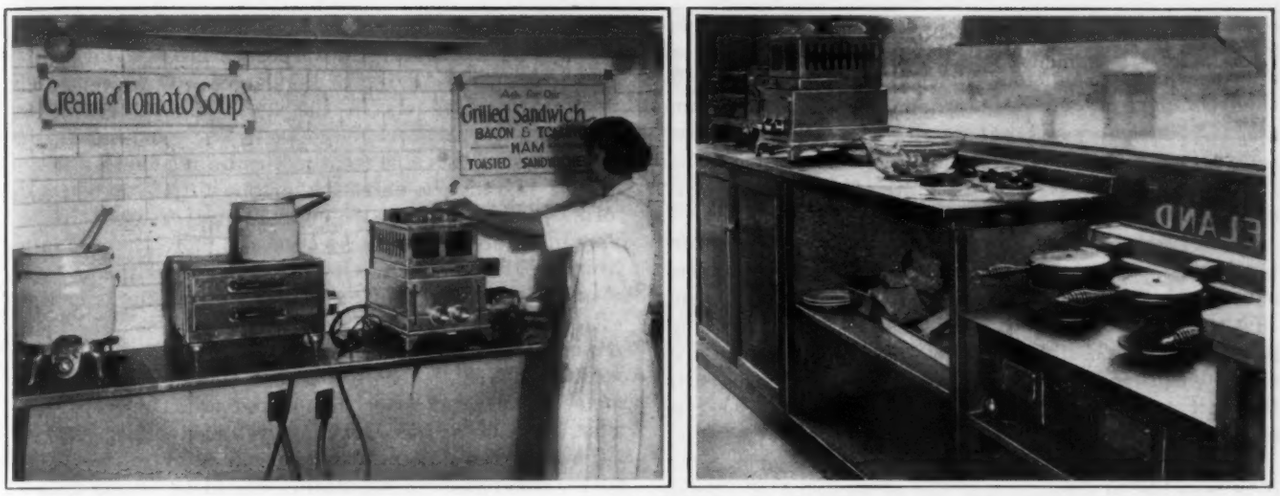
Dependability of Heat Supply—The success of any commercial kitchen hinges upon dependable heat supply, regular and capable of being regulated. Electricity is there when the cook turns the switch; there is no doubt as to whether the delivery man will arrive with oil, coal, coke or other fuels.

Permanency—The useful life of heavy-duty electric-cooking equipment is equal to or greater than that of any fuel-fired equipment. The reasons for this are obvious. The top plates, frame, sides, castings and oven linings are built so that with the use of electrical heat they last indefinitely. Added to this is the important fact that the maximum temperatures existing anywhere in an electric range are only enough higher than that of the food to insure cooking at the speed required. In fuel-fired equipment the maximum temperature to which the cooking surface is subjected is that required for combustion and may reach nearly 500 degrees above the actual temperature required. This combination of sturdy construction and lower maximum temperature results in remarkably long life and low maintenance of commercial electric-cooking equipment.

Reduction of Hazard—There are no flames, smoke, ashes or gases to contend with in electric-cooking equipment. Fire hazard with electric ranges is minimized. This item may not seem important, yet several fires have occurred in Cleveland during the past year from fuel-fired ranges, overheated or clogged flues, and bake-oven explosions. Although fire hazards may be covered by insurance, there are many damages resulting from fires that cannot be covered by fire insurance. These losses include personal injury, loss of production and loss of trade. Fire from fuel-fired equipment may result from causes beyond the operator's control, but

TABLE I—SOME COMMERCIAL ELECTRIC COOKING APPLICATIONS IN CLEVELAND, BY CLASSES

Type of Equipment	Approx. No. in Use or Ordered Up to April 1, 1925	Type of Equipment	Approx. No. in Use or Ordered Up to April 1, 1925
Ranges	25	Hot plates	7
Ovens	23	Urn heaters	4
Broilers	2	Doughnut stoves	2
Toasters	100	Doughnut machines	2
Griddles	10	Warming compartments	4
Waffle irons	25	Egg boilers	1
percolators	75		



ELECTRIC-COOKING EQUIPMENT IS USED EFFECTIVELY IN NEW "BUFFET" TYPE LUNCH ROOMS

electrical fires can result only from negligence in installation or operation—both positively avoidable.

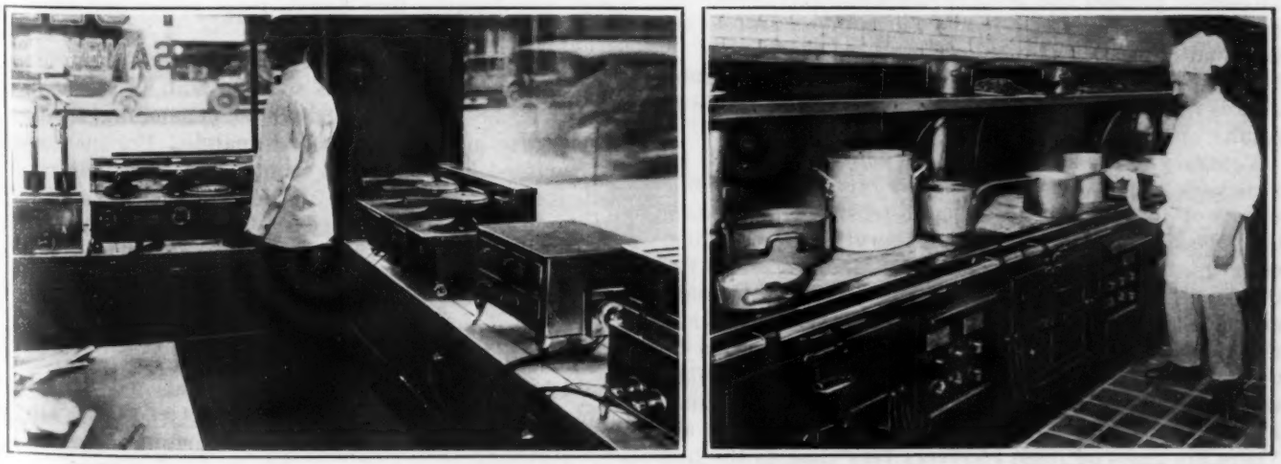
Satisfaction of Help—Labor turnover in a kitchen is expensive. Electric-cooking equipment serves to reduce this turnover by producing conditions conducive to satisfaction, comfort and convenience of employees. With electric equipment there need be no excessive heat in the kitchen, no fumes and no burns from flames or ashes. The chef can better regulate the heat and is always assured of a constant supply of it.

Saving in Space—For a given output and cooking capacity electric equipment occupies less space than the fuel-fired equipment, and because only the actual cooking surfaces are hot, there is less radiation of heat into the kitchen to cause discomfort. Electric equipment is easier to keep clean, and this means less work for the help. Electrical equipment eliminates valve adjusting, air regulation, making fires and carrying fuels and ashes. By the snap of a switch the operator can have exactly the heat that he wants and at the point where he wants it, and he can disconnect the instant he is done with it.

Flexibility of Location—The flexibility of electric-cooking equipment permits its use in established kitchens without elaborate alterations. Only the fumes from cooking food need be removed from an electric kitchen, thereby reducing ventilation requirements. No kitchen need be remodeled for an electric installation and a saving in space is always possible. These advantages enable considerable saving in the investment in new buildings, because delivery of fuel and disposal of combustion products do not have to be taken into consideration. Due to the even heat distribution, three electric ranges will usually handle the work of four fuel-fired ranges. By using 100 per cent of the baking space, a three-deck electric bake oven can usually replace a five-deck oven using other fuels, where the deck areas are the same.

Cost of Operation—No unit costs for electric cooking are presented, because investigations have disclosed a variation of as much as 500 per cent in the energy consumption per meal served. Among the variable conditions that affect costs are: (1) Number and distribution of meals served in twenty-four hours, some kitchens serving hundreds at one meal, others serving fewer at one time but operating throughout the day and night; (2) character of meals served, some kitchens serving table d'hôte meals, while other kitchens serve plate lunches and short orders; (3) preparation of meals, some kitchens doing the bulk of their cooking in advance and using electric heat during meal hours only for keeping food warm, while others serve à la carte orders only and require heat at all hours.

When prospects are interested in unit costs or com-



AT LEFT, A "SANDWICH SHOP" IN CLEVELAND THAT USES NOTHING BUT ELECTRIC-COOKING EQUIPMENT.
AT RIGHT, TWO ELECTRIC RANGES IN CLEVELAND CLUB

parative fuel costs, it has been found that specific operating estimates based on the prospect's own installation and operating conditions give more accurate results than comparison with other installations of the same general character. Therefore it will be seen that cost comparisons of one electric installation with another fuel-fired installation are difficult, if confined to cost of fuel and cost of electricity.

To arrive at a true comparison, the values of every feature of electric-cooking equipment must be compared with the limitations of other types of equipment. In the light of all its advantages its economy is apparent. It is possible to show that if depreciation of electric equipment be written off over its entire life, the unit cost is about the same as for any other type of equipment.

With all the advantages of electric equipment in mind, it is possible to demonstrate the superiority of electric cooking in nearly any locality.

Letters from Our Readers

Transmission Lines and Interference with Radio

To the Editor of the ELECTRICAL WORLD:

I have been very much interested in your two editorials of February 7 and April 11 on the matter of interference with radio reception. My interest arises from the fact that the membership of the American Radio Relay League gives me no opportunity at any time to forget that there exists such a thing as radio interference originating in power and lighting circuits.

Long-continued and widespread, although very loosely organized, observations have led us to believe that some of the current opinions with regard to interferences of this type are in need of revision. For instance, we can find no justification for the general belief that putting the antenna at right angles to a troublesome power line will in any way remedy matters. Very frequently this position is considerably worse than is one where the antenna is parallel to the line in question. In general, however, there appears to be no definite rule in either direction. The use of loop receivers for finding the source of interference by radio compass methods also has been in almost every instance a failure. A far more successful method has been to use a receiver with only moderate sensitivity at a number of points and to locate the final source of the interference by the method of finding where the greatest signal intensities concentrate. This is a trifle more laborious but much more positive in results.

Contrary to the statement in the editorial of April 11, I am very frankly convinced that by far the most prolific source of interference is the high-tension transmission line, classifying as high tension everything from 2,000 volts up. A simple demonstration of one ground for this belief is the fact that such interferences increase enormously during wet and windy weather, which has no effect whatever upon the appliances used inside of the home, they being accused in the editorial of being the major sources of trouble. New high-tension lines appear to be virtually free from any trouble at all. There are cases of radio receivers very close to the line carrying voltages above 100 kv. which are entirely undisturbed by the line in question.

Transmission maintenance men will be able to tell better than I whether the increased trouble with older lines is due to the aging of insulators or the development of defective contacts in the line. The interferences frequently travel scores of miles before reaching a point at which they are able to attack radio receivers. In one specific instance a defective primary fuse in a transformer connected to a 66,000-volt line created tremendous interference in a town removed more than 60 miles from the transformer. One of the most irritating types of interference is that created by series lighting lines with film cut-outs. These interferences are quite strong, tend to have a definite wave length and are exceedingly hard to locate, because they are radiated to some degree from every lamp, and because every lamp must be examined to find the trouble.

The Cottrell precipitator is fortunately not very frequent, otherwise its reputation would be worse than it is. These installations give rise to very strong radio-frequency surges because of the spark at the synchronous rectifier. Unless the chokes are used for suppressing this sparking, the entire system acts as a reasonable powerful radio transmitting station which is in constant operation and which is exceedingly broad because of the high decrement involved. Punitive measures have recently been applied to installations at Globe, Ariz., and Tacoma, Wash. These installations have previously created interference over a 50-mile radius.

The foregoing is merely intended to list those sources of interference which, judging from our correspondence, appear to be the major sources of difficulty. This does not at all mean to imply that the secondary circuits do not cause any interference. They do. They cause a great deal of it, and some of it is exceedingly intense, although usually very localized. In towns that are so unfortunate as to have been laid out without alleys, wires must of necessity be run through trees, and such towns are cursed with a constant crop of new leaks which cause local interference.

The appliances inside the household are also sources of trouble. Peculiarly enough, the most numerous difficulties appear to come from heating appliances, especially from heating pads equipped with thermostats and from electrical cooking devices which have developed defective contact. The first of the devices is a bad offender because of the constant opening and closing of the circuit, while the second ones are worse than electric lamps only because they handle more power and therefore originate stronger surges.

It is certainly unfortunate that the public attitude toward such interferences is so impatient. I feel, however, that the more forward-seeing generating companies are meeting the situation adequately. For instance, the Hartford Electric Light Company employs one man exclusively for the purpose of locating such sources of interference and either remedying the trouble or turning it over to the repair crew. Many of the smaller generating companies (and a few of the large ones) aggravate the matter by taking the attitude "What are you going to do about it?"

The whole thing seems to me to be a matter which should be taken up seriously by the National Electric Light Association. I am hardly satisfied with the report that most of the interference originates on the customer's premises.

S. KRUSE,
Technical Editor *QST*.
American Radio Relay League,
Hartford, Conn.

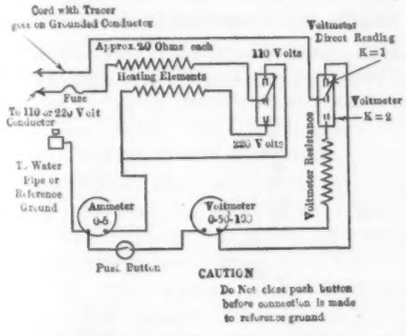
Central Station and Industrial Practice

Measurement of Ground Resistance

ACCURATE measurement of ground resistance has been a problem with many utilities, but the Milwaukee Electric Railway & Light Company is employing a method that is said to give very good results. The accompanying illustration indicates the apparatus used.

This consists of two heating elements with an approximate capacity of 5 amp. at 110 volts, arranged to be cut in series for use on a 220-volt circuit by means of a single-pole double-throw knife switch, a 5-amp. ammeter and a voltmeter having a scale of 0 to 50 volts and arranged with an external resistance and a single-pole double-throw switch to read 100 volts when necessary. This equipment is mounted on an 8-in. x 12-in. board furnished with suitable leads.

The principle of operation is based on Ohm's law, $E = IR$. Current is passed through two grounds in series —that is, the ground on the circuit supplies the testing current and the reference ground. The apparatus is



APPARATUS FOR GROUND RESISTANCE MEASURING DEVICE

connected as indicated in the diagram and the voltage and current are noted. The voltage divided by the current gives the resistance. In case either ground is a water pipe, it is customary to assume the resistance of it to be zero and the resistance as measured is then taken to be that of the other ground.

In case it is necessary to measure the resistance of a ground where no water pipe is available, the method is somewhat different. Two reference or auxiliary grounds must be available in addition to the one to be measured. These must be installed temporarily for the test, if not otherwise available.

The resistance of each of the grounds in series is measured as indicated above. If R_1 is the resistance of the ground the resistance of which is to be measured and R_2 and R_3 the resistances of the auxiliary grounds, then $R_1 + R_2$, $R_2 + R_3$ and $R_3 + R_1$ will represent the values measured by the instrument. The value of the resistance of each ground can then be computed as follows:

$$R_1 = \frac{(R_1+R_2)-(R_2+R_3)+(R_3+R_1)}{2}$$

If desired, the resistances of the auxiliary grounds may be computed from the following formula:

$$R_2 = \frac{(R_1+R_2)+(R_2+R_3)-(R_3+R_1)}{2}$$

$$R_3 = \frac{(R_2+R_3)+(R_2+R_3)-(R_1+R_2)}{2}$$

The range of the device is such that commercially accurate measurements can be made on grounds having resistances from 1 to 100 ohms.

Operating Experience with Concrete Poles

BY J. M. BROWN
Superintendent Electrical Department,
Oklahoma Gas & Electric Company, Oklahoma City

IN THE March 7, 1925, issue of ELECTRICAL WORLD on page 499 there appeared an article describing the experience of this company with concrete poles. Some further information on this subject is given below. In the former article three tables were given that require a little additional explanation.

In 1908 the manufacture of concrete poles was let out to a local concrete contractor at the price of $9.50 each. In 1910 this price was increased to $10.50 each and in 1911 to $11.50 each, this being the highest price paid for concrete poles of the hollow type. Before contracting for the manufacture of these poles the data given in Table I were collected. After the pole yard was established and the manufacture was going well, data were collected on the operating cost of the yard per month. They are given in Table II. From the figures given it may be seen why the contract price was raised after the contractor had started manufacturing the poles at a price of $9.50 each.

During the time the Oklahoma Gas & Electric Company was manufacturing the hollow concrete poles extensive tests were made to determine their strength. One pole was set 6 ft. in the ground and blocked solid at 28 ft. 6 in. from the top and at the ground line. A right-angle pull was exerted at the top with the results shown in Table III in the previous article.

As previously mentioned, it was very important that the reinforcing steel be kept within the center of the pole wall. The contractor was not sufficiently careful about this, even though he knew of its importance. As a result many poles were made in which the reinforcing steel on the lower side of the form was forced near the outer surface of the pole. This was not detected when the poles were installed. Its discovery occurred in the latter part of 1911 and early part of 1912, when Oklahoma had severe sleet storms. Many poles were found in which the reinforcing steel was exposed on the side of the pole which was the lower side when made in the form. Spalling of the concrete, which was very thin over these rods, occurred and was apparently due to contraction and expansion of the steel due to the sudden changes in temperature. Exposure of the reinforcing did not occur in any of the poles that were properly made. As a result of the careless manufacture of many poles it has been necessary to change several hundred poles since that time—about 300.

SOLID SQUARE POLE ADOPTED

In May, 1911, a series of tests was made on concrete poles of various types and with various sizes of reinforcing in order to develop a pole that could be used for heavier loading than the original hollow pole was capable of withstanding safely. As a result of these tests it was found that a solid square pole containing four ¾-in. rods was the most suitable and the strongest type of pole for

heavy loading. Data obtained in testing some of these poles are reproduced in Table IV.

Following this test, a second test was made on the same type of pole except that ¾-in. reinforcing steel was used. The test data are given in Table V.

After obtaining the results of these tests, pole type No. 30 was adopted for heavy loading, except that the butt diameter for a 40-ft. pole was increased to 16 in. and the top diameter increased to 7 in. The butt diameter of a 35-ft. pole was increased to 14 in. and the top diameter to 7 in. The steel used in the 35-ft. pole was changed from ⅞ in. to ⅝ in. For manufacturing the square solid poles forms were immediately made.

At this time enough 40-ft. poles were made to construct a new main feeder line from the generating plant. The 40-ft. poles made for this line cost $16.50 each to manufacture. This line was designed to carry twenty-four No. 4/0 conductors and sixteen smaller-size conductors. The construction work was completed in the early part of 1912 and to date is in apparently perfect condition. Only one case of trouble has developed on the line, that being a series circuit coming loose from the tie and grounding on the steel cross-arm.

At this time trouble is being experienced with the poorly made hollow poles. Consequently the 35-ft. poles are being made solid instead of hollow. After making the solid poles for some time, it was found that the solid pole could be made as cheaply as the hollow pole and was much stronger. However, the transportation charges were higher on the solid pole. Experience in operating concrete-pole lines up to 1913 led the Oklahoma Gas & Electric Company to believe that the concrete pole had a certain place in distribution lines, that being only in permanent feeder circuits on streets which had been permanently developed, where the poles would not be likely to be disturbed, and in such lines as would not require frequent service and transformer work on the poles.

CONCRETE USED ONLY FOR MAIN FEEDERS AT PRESENT

Up to this point the writer has endeavored to show that concrete poles can be used for any purpose for which wooden poles may be used and that they have many advantages over wooden poles, although they also have a disadvantage. One of the many advantages the concrete pole has is the improved appearance from the public viewpoint. When the public once becomes acquainted with the concrete pole, it is difficult to set a wooden pole on any street or in any place where it will be conspicuous. The concrete poles could be made to accommodate pole steps if desired, but for use on distribution systems steps were considered hazardous and were not used. All of the work on concrete poles is done from extension ladders. Work on concrete poles is more hazardous than on wooden poles, because the entire pole and fixtures are grounded, but no more hazardous than on the steel poles extensively in use today. On the other hand, it may be contended that a pole that conducts electricity is less hazardous than one that does not, because the former does not give a full sense of security and thus induces carelessness.

The construction cost of a line built with concrete poles and steel arms like those mentioned is double that of a line built with wooden poles and wooden arms. However, a concrete-pole line has an indefinite life if properly made and constructed, as against a maximum of fifteen to twenty years' life with wooden-pole lines.

One objection which has been found with steel-angle cross-arms was that in stringing conductors it was impossible to pull the wire over the cross-arms as is done with wooden arms, because the sharp corner of the angle will damage the insulation or the insulation covering and decrease its life. Another objection to the use of concrete poles for distribution work is that in case of line trouble or transformer trouble it requires two men to repair the trouble, as one man could not ordinarily handle the extension ladder required.

TABLE IV—COST AND TEST RESULTS ON REINFORCED-CONCRETE POLE WITH ¾-IN. REINFORCING RODS

(Pole No. 30)

Date of test	July 5, 1911		
Age of pole at date of test	Days from 5-19-11 to 7-5-11		
Length of pole	39 ft. 6 in.		
Cross-section on top	6 in. square		
Cross-section of bottom	12 in. square		
Length above ground line	33 ft. 6 in.		
Style	12 in. square butt, 6 in. square top, solid		
Calculated breaking load (top pull)	1,800 lb.		
Reinforcing rods	4¾ in. square		
Total, per cent	2.43		
Per cent steel in tension	121		
Concrete (estimated), 1 yd			$6.00
Weight of rods, 416 lb., at		$0.02	8.32
Weight of tie wire, 85 lb., at		0.02	1.70
Cost per pole			$16.02
Weight (total actual)	3,500 lb.		
Distance of load above ground line	32 ft. 6 in.		
Distance of load above point of failure	22 ft. 7 in.		

Load Applied (Lb.)	Corresponding Deflection (In.)	Permanent Set (In.)	Remarks
620	12½	...	
852	17⅞	...	
968	19	...	Hairline cracks 2 ft. to 15 ft. above ground
1,088	21¼	...	Little more open
1,200	23½	...	
All load relieved	...	1½	
620	14½	...	
968	21½	...	New hair crack near ground, 8 in.
1,632	31½	...	10 ft. from ground line, ¹⁄₁₆-in. opening
1,732	32½	...	Hairline crack 3 ft. below ground (wider)
1,842	34½	...	
1,962	36	...	Two times as many cracks, but no cracks at ground line opened up ¹⁄₁₆ in.
2,082	41	...	
2,202	Rupture	...	
Failed 6 in. above ground	...	...	Rest of pole above ground line recovered to straight line
Relieved			
1,402	54½	...	
620	41	22½	
All weight relieved		...	All due to bend at point of rupture.

TABLE V—COST AND TEST DATA ON CONCRETE POLE WITH ¾-IN. REINFORCING RODS

(Pole No. 31)

Date of test	July 27, 1911		
Age of pole at date of test	40 days		
Length of pole	39 ft. 6 in.		
Cross-section on top	6 x 6 in.		
Cross-section on bottom	12 x 12 in.		
Length above anchor line	33 ft. 6 in.		
Calculated breaking load at top	13,000 lb.		
Reinforced rods	4¾ in., 40 ft. long, twisted 1.76 per cent		
Total per cent	0.88		
Per cent steel in tension	0.88		
Concrete (estimated), 1 cu.yd., at		$6.00	$6.00
Weight of rods, 306 lb., at		0.02	6.12
Weight of tie wire, 85 lb., at		0.02	1.70
Cost per pole			$13.82
Weight (total actual)	3,400 lb.		
Distance of load above ground line	32 ft. 6 in.		
Distance of load above point of failure	22 ft. 7 in.		

Load Applied (Lb.)	Corresponding Deflection (In.)	Remarks
577	1	Strain relieved from first blocks 11 ft. from top of pole
1,176	7½	First signs of cracks 16 ft. 6 in. from top
1,372	12½	Pole supported by the ends
1,420	12½	Small cracks under side 6 ft. 6 in. from large end to 6 ft. from small end
1,500	17	
1,690	23¾	Crack noticed 4 ft. 6 in. from large end
1,732	25	
1,794	27½	Width of larger cracks approximately ¹⁄₁₆ in.
1,854	29½	
2,014	36½	
2,022	38	
2,082	40½	Cracks becoming larger
2,018	43	Cracks approximately ¹⁄₁₆ in. in width
2,152	47	Cracks nearly ¹⁄₁₆ in. wide at 15 ft. 2 in. from butt
2,162	50	Cracks becoming wider
2,180	52	Began to fail on top at a point 15 ft. 11 in. from the large end. Crack under point of failure nearly ⅛ in. wide
2,186	56	Beyond this point as jack was tightened up three turns scales showed 60 lb. less load.

This obstacle not only doubles the labor cost but slows up repair work considerably. This is objectionable, because it is important that transformer fuses be replaced speedily in order to re-establish service as quickly as possible.

As stated at the outset, the Oklahoma Gas & Electric Company has not been making concrete poles since 1914, because materials and labor have made it uneconomical to install them, with cedar poles at their present price. Only the main feeder lines are at present constructed of concrete poles.

Method to Copy Drawings and Photographs

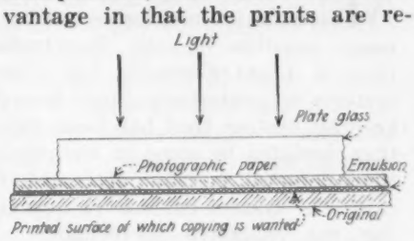
BY KIICHI TOJO
Shibaura Engineering Works, Tokio, Japan

VERY often there are occasions when copies of photographs, diagrams and tables in books, periodicals and other publications are desired. Copying by hand is tedious and likely to cause errors. Photographic cameras or photostats may be used with advantage, but the cost and complication of apparatus sometimes make their use undesirable and even prohibitive. Under such circumstances the method described below will be found very convenient and quite satisfactory.

The method consists in first making a paper negative of the original and then making positive prints therefrom. For the negative any photographic printing paper, either gaslight paper or bromide paper, may be used, but those having "hard" contrast are preferable. The photographic paper is put on the printed surface of the original paper, with the emulsion side down (that is, both papers face to face), and then a piece of plate glass is placed on it so that the papers are together.

Then the photographic paper is exposed, the light being applied from the reverse side of the photographic paper as shown in the accompanying illustration. The duration of the exposure depends upon the quality of the original paper, the intensity of the illumination and the kind of photographic printing paper. After the exposure this is developed and fixed, washed and dried in the usual way and a paper negative is obtained. After this the paper negative is treated in the same way as the usual dry-plate negative, and any number of positive prints may be made therefrom on any suitable printing paper whenever wanted.

The method is due to M. Hagiwara, research engineer of this company. Besides its simplicity and ease of manipulation, the method has an advantage in that the prints are remarkably free from "blur," since the photographic paper is kept in close contact with the original or the negative. There is no trouble to effect the sharp focusing that is needed in using photographic cameras or photostats.



ARRANGEMENT OF APPARATUS FOR COPYING PRINTED MATERIAL

Charging Equipment for Electric Trucks

BY F. A. WESTBROOK
Consulting Engineer, New Canaan, Conn.

DELIVERY wagons for large capacity laundries encounter service conditions very similar to those engaged in other extensive retail businesses, which makes it economical to use electric drive—that is, they have short hauls, frequent stops and always put up for the night in the same place.

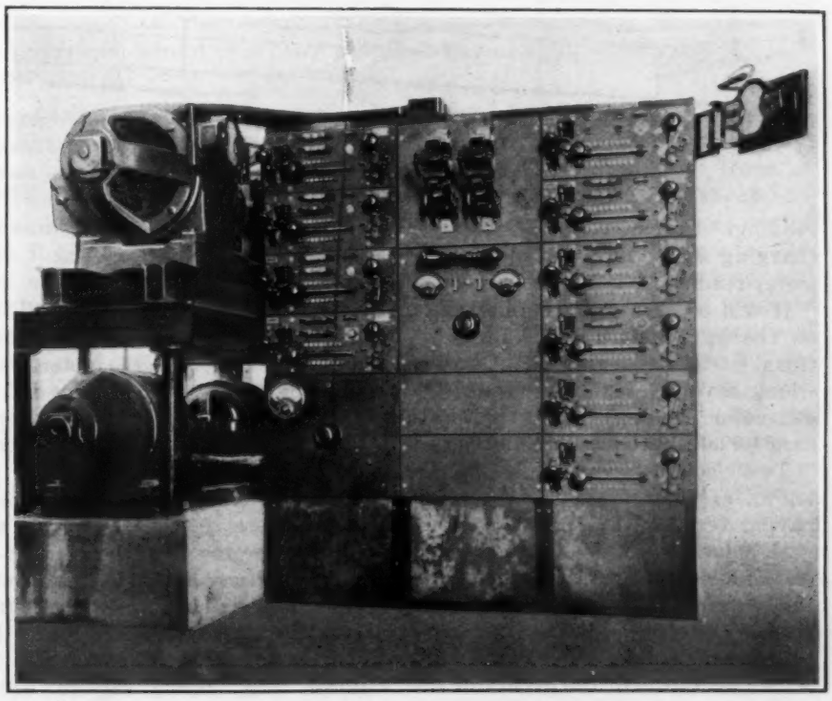
The National Family Laundry Service Corporation of New York has a considerable number of electric delivery wagons in operation at one of its plants and consequently has had to make provision for charging the batteries. The accompanying illustration shows the two motor-generator sets and switchboard for the charging circuits installed by MacNutt-Watts & Tankard, electrical engineers and contractors of New York.

This outfit is located at one end and near the edge of the loading platform. Located at intervals along the platforms are twelve charging plugs, each of which is fed by two No. 2 A.W.G. rubber-insulated and braided conductors in 1¼-in. conduit laid in the concrete structure. Two of these are spare at the present time.

The two motor-generator sets are mounted one above the other so as to use a minimum of the valuable space on the loading platform. The lower machine is 35-kw. and the upper 20-kw. capacity.

The lower part of the left-hand panel of the switchboard contains the voltmeter and field rheostat for the lower generator. The main line fuses for this generator are at the back of the switchboard.

The center panel contains the control apparatus for the upper generator. This is arranged as follows, starting at the top: Double pole main line circuit breaker, voltmeter and ammeter, meter fuses between the above, and field rheostat. Both generators have recording wattmeters at the back of the switchboard



ELECTRIC TRUCK-CHARGING MOTOR-GENERATORS AND CONTROL PANELS

and both motors have compensators there for starting the sets.

The other sections of the switchboard contain control apparatus for each of the charging lines terminating along the loading platform. Each of these sections, or battery-charging units, are equipped with the following equipment: Adjustable rheostat, overload, no voltage and reverse current relays, meter-reading switch, pilot light to show that circuit is in use, main line fuses and meter-reading fuse.

One voltmeter and ammeter gives readings for any of the battery-charging units when the appropriate meter-reading switch is closed.

It will be seen that there is space on the switchboard for eight additional battery-charging units, two of which have already been used. The generator capacity is sufficient to care for all these possible units.

Two conductor flexible cables, known as "battery-charging cables," having very fine stranding, provided with polarized plugs at each end, are used for connecting the batteries on the wagons to the outlets on the loading platform. The polarized plugs, of course, insure that the proper terminals of the generator are connected to the proper terminals of the batteries.

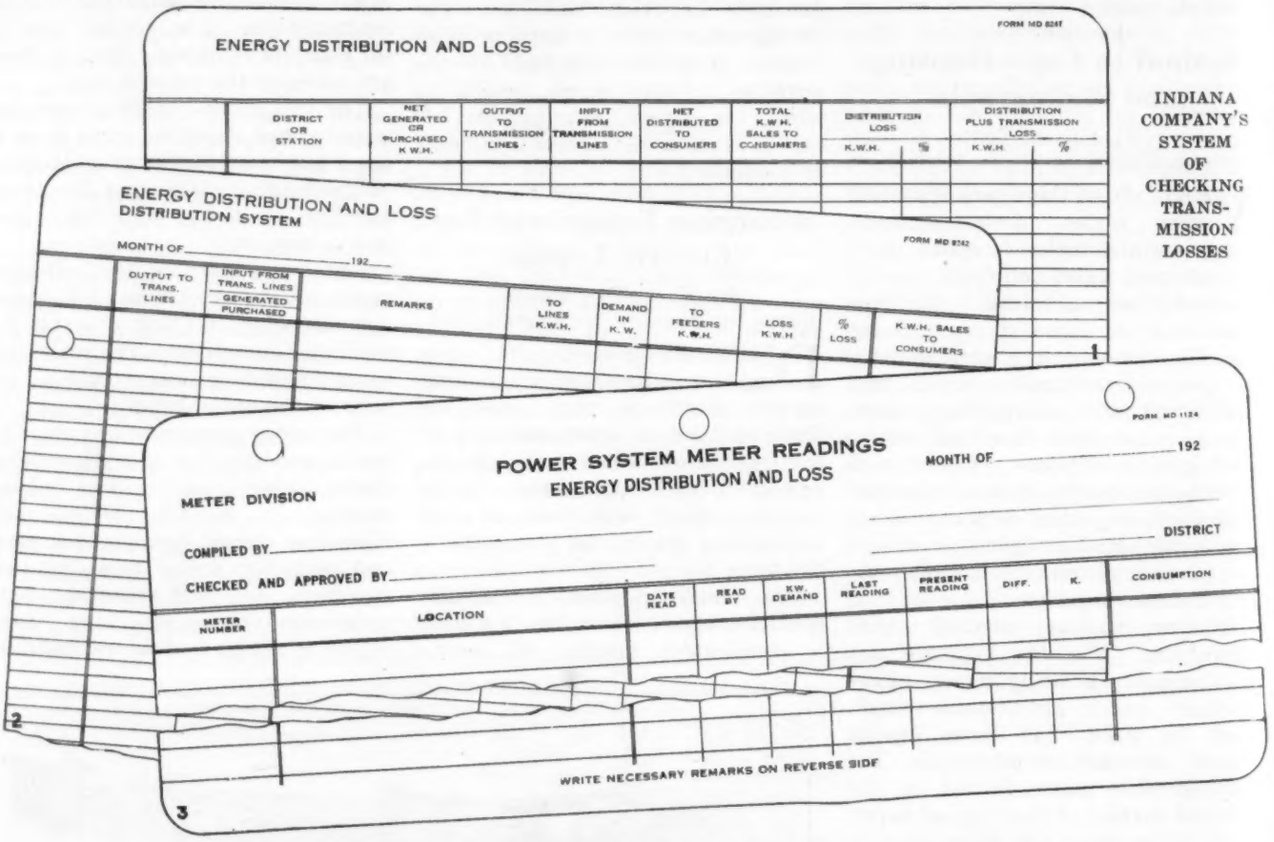
Allocating Energy and Losses

MONTHLY analysis of energy distribution and losses has been made possible on the Merchants' Heat & Light Company and allied systems by a relatively simple record-keeping system that has been more than justified by some of the conditions detected thereby. More specifically, the system enables (1) checking the collective performance of consumers' meters; (2) allocation of energy to various localities served; (3) performance of the transmission and distribution systems; (4) obtaining authentic figures for accounting and intercompany billing of generated, transmitted and distributed energy; and (5) determination of important demands for different communities and large consumers.

A summary by districts and companies of all energy generated or purchased and comparison thereof with the sales to consumers are afforded by the record shown on Fig. 1. The quantities listed are obtained from the distribution system detail sheets, Fig. 2. Net generation is the gross generation less energy for excitation only, house service being treated as a sale to consumers. Purchased energy includes only that from outside utilities and does not include purchases of energy among companies in the interconnected or allied operating group of properties. Intercompany purchases and sales of energy are not included in the summary of energy distribution and loss for the group of companies, because such energy is always resold (considering the group as a whole).

The energy furnished each particular customer or group of customers for each district is set opposite the kilowatt-hour sales and energy loss in Fig. 2. Totals are given for the district for kilowatt-hour sales to consumers, kilowatt-hour loss and net generated to consumers. The net distributed to customers for each district is found by adding to the generated and purchased energy the input from transmission lines and deducting the output to transmission lines. This quantity is the base upon which the per cent distribution loss in the district is figured.

On the distribution sheets for each district a column is assigned for kilowatt demand. These demands are given when available and can always be obtained for any customer, line or connection shown on the detail sheet by the installation of a demand meter instead of an ordinary meter.



INDIANA COMPANY'S SYSTEM OF CHECKING TRANSMISSION LOSSES

Fig. 1—Segregation of energy distribution and losses. Fig. 2—Distribution details from which analysis is made. Fig. 3—Meter reading report forms that eliminate most sources of error

From the data in the two columns on the left in Fig. 2, all energy put into the transmission system can be compared with the energy taken out to obtain transmission system loss for any desired sections of the system. Interchange of energy can be summarized monthly for an intercompany energy transfer report by using individual meter readings at the points of interconnection and, when necessary, figures in the transmission and distribution sections of the sheets shown in Figs. 1 and 2.

Meters measuring outputs from or input to transmission lines are usually located on the low-voltage side of the transformers to feeders or low-voltage lines so that the loss on not more than one transformation step is determined as belonging to the transmission line. No energy should be taken from the transmission lines to large or small-group customers unless a totalizing meter measures the output from the line.

The total loss from source of production to consumer is obtained for each district by adding to the kilowatt-hour distribution loss the kilowatt-hour transmission loss (as obtained by apportionment for each district from the transmission line total loss figures). The total or combined transmission and distribution loss for all the districts can then be expressed as a percentage of the generated and purchased energy for that group to get an over-all loss from production to consumer. This figure is shown for the entire group on the summary sheet and is expressed as a percentage for the entire group only.

In Fig. 3 is shown a meter-reading report sheet that has proved accurate and effective in collecting all of the meter readings necessary for work of this nature. By collecting meter readings only and having full data on file for every power system meter, nearly all sources of error in reporting are noted from month to month.

Complete figures for the entire system are worked up every month. Each month's report is helpful and a compiled twelve-months report has proved of exceptional value in planning and executing many phases of operation.

Clearances for Rigid Conductors

WHEN rigid conductors are installed by the Utica Gas & Electric Company the minimum distances given in the accompanying table are generally followed. These figures are an average of those recommended by several manufacturers, operating companies and the individual records of the Utica company. Recently apparatus has been brought out where the minimum distances to ground or between opposite live parts are less than those given herewith. In general, it has been found upon test that this apparatus will function properly, so the company in these cases has disregarded the table and used the equipment.

CLEARANCE OF RIGID CONDUCTORS

Volts	Indoor—Recommended Minimum Distance				Outdoor—Recommended Minimum Distance			
	To Ground		Between Opposite Line Parts		To Ground		Between Opposite Line Parts	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
230	0	1	0	1½	0	1½	0	2
460	0	1½	0	2	0	2	0	3
600	0	2½	0	3	0	3	0	4
2,300	0	3	0	7	0	4	0	8
4,000	0	4½	0	8	0	6	0	10
13,200	0	8	0	10	0	10	0	12
22,000	0	11	0	15	0	14	0	18
44,000	0	20	2	4	2	2	2	6
66,000	2	3	3	2	3	0	3	6
110,000	3	4	5	0	4	0	6	0

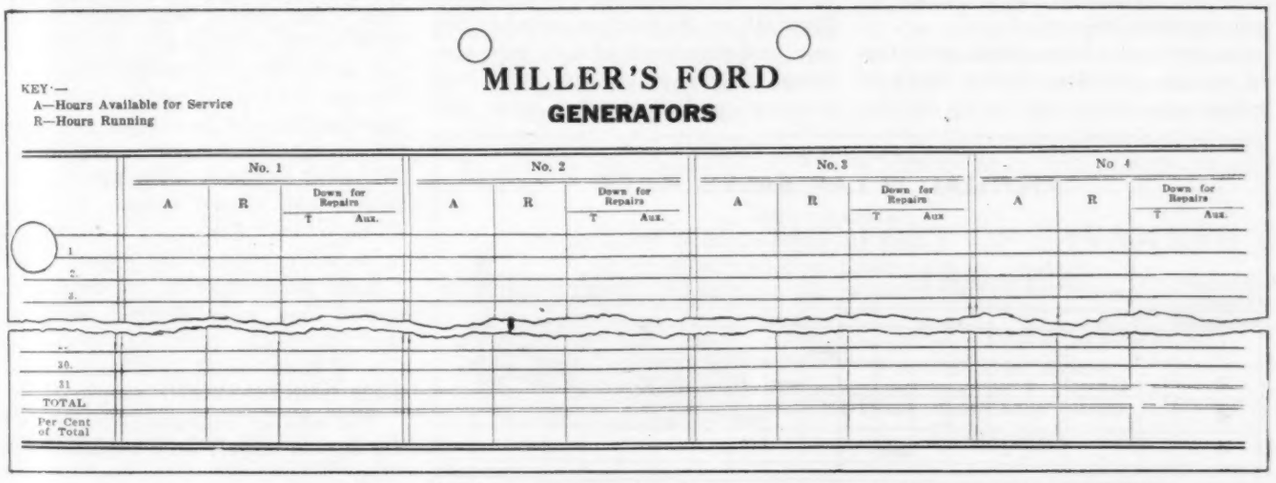
Outages of Equipment Checked Regularly

BY R. D. GILLESPIE
Superintendent Miller's Ford Station, Dayton Power & Light Company, Dayton, Ohio

FOR more than five years the Dayton Power & Light Company has had its operators record on log sheets the periods during which various important pieces of equipment are in service, down but available for service, and down for repairs. This information is made easily interpretable by drawing a line under the period when equipment is in service, and using the abbreviations D. A. and D. R. to indicate periods when down but available or down for repair.

To enable a hasty survey of the extent to which equipment, and consequently the investment, is being used, the data on the log sheets regarding these subjects are recapitulated by the office force and presented in some such from as shown. In this form A stands for available and R for running; in the third column, headed "Down for Repairs," T stands for turbine and Aux. for auxiliaries, which indicate whether the turbine is down and being repaired, or whether the auxiliaries are being repaired. Each month the percentage of time the equipment is down for repairs or down but available is indicated.

Such information prevents overlooking excessive outage of equipment and suggests when urgent measures must be taken to prevent such outages. The variety of subjects that demand the consideration of any operating executive is likely to prevent proper attention to this subject of use of investment unless some such method is used.



RELATION OF OPERATING PERIOD TO TIME DURING WHICH IT IS DOWN BUT AVAILABLE OR DOWN FOR REPAIRS IS KEPT FOR ALL IMPORTANT EQUIPMENT

Commercial Activities and Public Relations

District Sales Competition Stimulates Activity

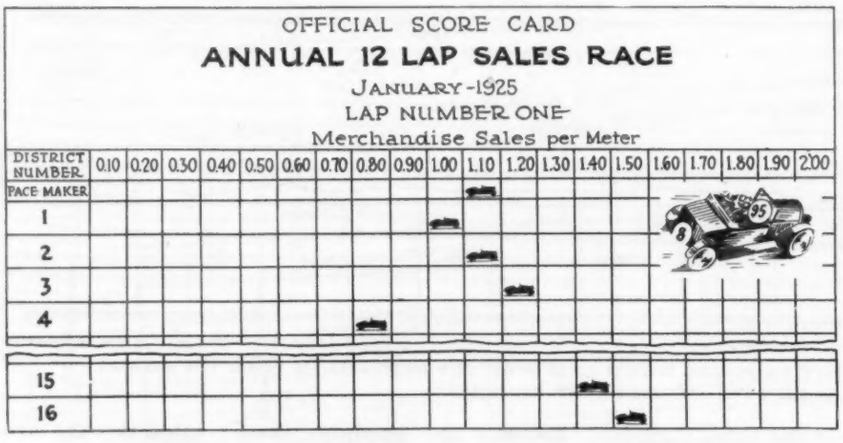
BY A. C. CRANDALL
Sales Manager Central Indiana Power Company Subsidiaries, Indianapolis

COMPETITION among district offices for the best showing on merchandise sales has been established among the subsidiaries of the Central Indiana Power Company in an interesting and effective manner. The relative standing of the different districts is graphically represented by a "cross-country automobile race" in which the distance covered by each district is based on (1) monthly sales per meter and (2) net profit on merchandise sales.

In comparing commercial activities of various districts on the basis of gross sales alone, the small district would obviously be put at a disadvantage. On the other hand, if the sales are compared on the basis of dollars per meter, the large district is generally at a disadvantage. To equalize these factors in this contest it was determined to consider also net profit on merchandise sales.

The contest record which is indicated in the accompanying illustration includes the assignment of a motor car to each district. On the speedometer is indicated the monthly merchandise sales per meter in dollars and cents. On the gas tank is indicated the net profit or money left in the treasury from merchandise activities. A pace-making car establishes the bogey for the month. Each month constitutes one lap of the race and at the end of each three months, "the quarter," a chart is prepared showing the cumulative totals of the various districts for the three months.

One very definite benefit of the contest has been evidenced in the abandonment on the part of merchandise men and managers of a certain apathetic attitude of complacency over existing conditions when what was actually being done in other districts was thus brought forcibly to their attention. While the units of measurement utilized in this contest may not tell the whole story of the ability and efforts of the district personnel, yet the results desired — increased interest and more sales—have been achieved, and it may be said that so far as merchandising activities are concerned the basis set up for the competition has been of value as a guide to the general sales organization in assisting weak districts and encouraging the strong ones.



SCORE CARD AND RUBBER STAMP FOR CROSS-COUNTRY RACE—MONTHLY MERCHANDISE SALES

Figures on the speedometer represent monthly merchandise sales per meter in cents. Figures on gas tank represent net merchandise profit in per cent.

Revenue from Commercial Lighting Consumers

ANNUAL energy consumption and revenue from various classes of commercial lighting consumers are shown in the accompanying tabulations taken from a recent survey in a California city of 75,000 population. The survey was made to determine the average annual earnings per kilowatt of connected load and demand for typical commercial lighting installations in comparison with the revenue derived from other classes of business. The figures represent well-lighted stores or places of business. Especially large signs or locations where the sign formed a large percentage of the total connected load were avoided in order that the results might be representative of commercial lighting business aside from the electric sign load.

The smaller consumers in Table I are served largely on a regular block rate.

The average cost for the 217,287 kw.-hr. used is $0.036 per kilowatt-hour. This total consumption on a total connected load of 111.364 kw. shows a use of slightly over 2,000 hours per year. This 2,000 hours a year means a use of 6⅔ hours per day on a basis of 300 operating days per year.

The larger consumers in Table II are served on a demand rate, and their earnings are shown on the basis of a fifteen-minute maximum demand. The rate on which these consumers are served consists of a

TABLE I—CONSUMPTION AND REVENUE FROM COMMERCIAL LIGHTING CUSTOMERS—SMALL STORES

Business	Yearly Consumption, Kw.-Hr.	Annual Revenue	Connected Load in Kilowatts	Annual Earnings per Kw. of Connected Load
Restaurant	17,418	$609.88	8.285	$74.82
Restaurant	13,275	479.39	7.630	62.83
Confectionery	45,720	1440.30	11.700	123.10
Confectionery	22,870	799.12	15.204	52.62
Hardware	4,480	205.36	7.580	27.08
Hardware	9,376	369.67	10.695	34.84
Hardware	27,584	979.34	16.000	61.20
Jeweler	5,984	294.35	2.235	131.25
Jeweler	8,400	$391.20	4.140	$94.49
Clothier	5,322	268.08	3.625	73.95
Clothier	11,200	492.39	11.550	42.63
Auto sales	14,360	622.84	12.900	48.20
Auto sales	23,664	549.99	4.500	119.99
Auto sales	7,634	359.13	9.720	36.74
Totals	217,287	$7,861.04	111.364	(Ave.) $70.58

TABLE II—CONSUMPTION AND REVENUE FROM LARGE STORES AND OFFICE BUILDING

Business	Yearly Consumption, Kw.-Hr.	Annual Earnings	Maximum Demand in Kilowatts	Annual Earnings per Kw. of Demand
Department store	107,520	$3,639.60	54.40	$67.00
Department store	123,240	4,175.40	55.20	75.70
Office building	52,910	1,867.47	30.40	61.30
Totals	283,670	$9,682.47	140.00 (Ave.)	$69.20

demand charge of $10 for 4 kw. or less of maximum demand per month, and $2 per kilowatt for all in excess of 4 kw. of maximum demand per month. The energy charge is 2½ cents per kilowatt-hour.

The earnings per kilowatt-hour are surprisingly similar on both large and small installations. The earnings per kilowatt of connected load on the small installations vary from the earnings per kilowatt of maximum demand on the large installations by only a small amount.

Utility Advertising a Community Service

Publicity Program of Savannah Electric & Power Company Links City's History with Industrial Advantage and Gains Wide Public Approval

PROBABLY no public service corporation has staged an advertising campaign that gained more popular public indorsement in the territory served than that of the Savannah (Ga.) Electric & Power Company, which to date has been running more than twenty months, is still going on and appears to be gaining momentum each week.

The outstanding feature of this publicity program is the fact that the power company has made no effort in these advertisements directly to sell either transportation, light or power, or even to suggest their use. The sole purpose, as announced by the management, has been to awaken civic pride, inform every man, woman and school child in Savannah as to the past history, present advantages and future opportunities of their city, and to pledge the complete co-operation of the power company in all constructive movements.

Howard C. Foss, president of the Savannah Electric & Power Company, and his associates, believe that civic consciousness, community pride and team spirit must be the foundation of greater prosperity, and that in whatever ratio the whole people boost and work together like the members of a great club, so will every interest in Savannah reap a reward.

The campaign started late in 1923 with a series of historical newspaper advertisements. These advertisements occupied a space approximately fifty inches every Monday in both the local morning and afternoon newspapers. There were fifty of these sketches, each dealing with some important event in Savannah's history from the landing of Oglethorpe, founder of the colony, on through the period of Colonial history and forward to the days of the Confederacy and afterward.

To compile this material it was necessary for members of the company to make much painstaking research, with the result that, aside from the advertising value accruing, the Savannah Electric & Power Company has collected and is publishing a historical work of great value to the city and state.

Immediately after the close of the historical campaign a survey of Savannah industries was made and another series was brought out, each one describing a Savannah industry; in these advertisements data were given, indicating the value of that industry to Savannah, its payrolls, the number of its employees, the source of its raw materials, its markets and the advantages such as climate, availability of labor, accessibility to consuming areas and other factors, which make the city a strategic point for the operation of such an industry.

While these subjects have been handled in the newspapers, a street car poster campaign has also been under way in which much of the newspaper copy is used in condensed but effective manner.

The Savannah Electric & Power Company's policy and motives in the campaign are summarized by President Foss as follows: "This company feels, as perhaps every citizen feels, that when the people of a community and section understand the problems and achievements of those who live and labor within their own gates, there can be brought about a greater civic pride, a more complete fellowship and a broader conception of the individual's public obligation as to the exercise of his initiative and loyalty in furthering the interests of his city and everybody in it."

The Savannah Electric & Power Company plans within a few weeks further to advertise Savannah by a series of articles dealing with industrial possibilities in that city.

This will be based on accurate and first-hand information as to raw products in the Savannah zone, transportation rates, power costs, labor, climate and other factors as applying to the successful manufacture of commodities not now made in the city.

The two advertising campaigns, historical and industrial, have proved so popular that a great many requests have come to the company to preserve all this information for posterity in book form, which the company expects to do.

THE PORT OF SAVANNAH 1736---1923

This is No. 7 in a series of little sketches compiled from various sources for the purpose of keeping alive in our memories the history and traditions of Savannah and published by

R. C. BROOKS, Manager

Savannah Electric and Power Company

THE port which exported the first bale of cotton and from which sailed the first steamship that ever crossed the Atlantic Ocean, could reasonably be expected to have a commercial history of more than passing interest. Always a leading factor in domestic and overseas trade, Savannah has forged overseas, with lumber, skins, hogs and other produce, consigned to a London firm. The cargo was valued at $10,000. This was followed by other solid ship loads to foreign ports and the fact that tar and pitch were found to have been included in large quantities indicates that early cargoes forecast in a measure

HISTORICAL AND INDUSTRIAL ADVERTISING SPONSORED AND PUBLISHED BY THE SAVANNAH ELECTRIC & POWER COMPANY

An Initial Home-Lighting Campaign

BY W. T. RYAN
Washington Water Power Company, Spokane, Wash.

AS THE first step in a general campaign to improve lighting in the homes served by its system, the Washington Water Power Company of Spokane recently completed a special six weeks' sale of kitchen-lighting units. Two important factors were considered in choosing the particular time of year for such a sale: It is difficult to find any electrical appliance upon which all the permanent salesmen can concentrate their efforts, and furthermore, with lengthening periods of daylight, the use of lighting is decreasing, so that the effect of increased wattage upon lighting bills is not apt to be noticed.

Great care was taken in the selection of a suitable unit. The one finally chosen was available in two styles, plain and with convenience outlet. It was difficult to estimate the number of each that would be sold, but it was believed that approximately 10 per cent of the residential customers could be sold, as has happened in a number of other places.

The execution of the campaign was under the direction of R. B. McElroy, assistant sales manager, Spokane, and J. F. Farquhar, general agent for outlying towns. The ten city salesmen were carefully coached upon the possibilities of this sale, and similar steps were taken to insure that the twenty-four district agents should have all the information required. The Spokane salesmen were furnished with route lists by the collection department, which indicated on these lists those customers whose credit was doubtful. The salesmen were impressed with the need of making every moment count and to go to the kitchen door so as to be able to start demonstrating the sample lamp in the room where it would be used.

A circular describing the unit was mailed to all the residential customers on the system so as to reach them in advance of any calls. In Spokane two illuminated bulletin boards on the principal car lines were installed, and during the six weeks' campaign 1,200 inches of advertising was run in the local papers. The results of the campaign are shown in the accompanying tabulation, from which it appears that the average wattage in the kitchen was doubled.

RESULTS OF SIX WEEKS' LIGHTING SALE

	Daylite Units Sold		
	Plain	Convenience Outlet	Total
Total for suburban towns	275	754	1,029
Total for Spokane	282	1,945	2,227
Grand total	557	2,699	3,256
Average wattage installed per unit			115
Average wattage removed per unit			57
Average wattage increase per unit			58
Percentage of residential customers sold:			
Suburban			11
Spokane			9
System			9.5
Special data for Spokane:			
Total number of calls			14,532
Total number of trials			2,903
Total number of net sales			2,227

The prices for the equipment were $7.50 for the plain unit and $8.50 for the unit with convenience outlet, installation included. These were based upon initial payment of 75 cents, the balance payable at 75 cents per month. For cash 10 per cent discount was allowed, and in Spokane this discount was taken by 507 purchasers. Ten days' free trial was allowed.

Either a 100-watt or a 150-watt lamp was installed with the unit, and the salesmen were particularly instructed to specify a sufficiently large lamp so that a distinct improvement in the lighting would surely be realized.

In order to give prompt service in making installation, arrangements were made with fourteen electrical contractors in Spokane who handled most of the work. A price of 75 cents per unit for installation or removal was agreed upon, and in Spokane the average cost per unit sold and retained was 83 cents. The salesmen were allowed a commission of $1 per unit for each one retained by a customer.

The large proportion of units sold with convenience outlets was a matter of some surprise and considerable satisfaction to the company, as it insures that small appliances will be used in the kitchen which otherwise might not be used for lack of an outlet.

Rural Power Survey in California

THE California Committee on Relation of Electricity to Agriculture is making a survey of the state in order to develop accurate data showing the detailed use of electricity on the farm. A postcard questionnaire, as shown here, will be sent to all rural customers of power companies in the state. It has been estimated that between 75,000 and 100,000 cards will be required. The total cost will not exceed $2,500 and by having each company pay for the cards required for its own rural consumers the expense will be equitably divided.

Another questionnaire has been sent to each central station requesting the following information:

Number of rural consumers of electric power.
1. Number using electric lights.
2. Number cooking or heating with electricity.
3. Number using electricity for agricultural power.

How many of classifications 1 and 2 are actual farmers—that is, individuals depending upon farming for their livelihood?

Total mileage of rural distribution lines (length of pole line, not of wire) carrying 20,000 volts or less.

Total connected agricultural load (classification 3).

Total 1924 revenue from this load.

The committee realizes the importance of having its purpose understood and is conducting an educational campaign through farm center talks, special articles in farm journals and the press. Radio talks are planned to be given about the time the cards are mailed.

	ELECTRIC MOTOR USED FOR	TOTAL No	TOTAL H.P		ELECTRICAL HOUSEHOLD APPLIANCES	No.		ELECTRIC LIGHTS	No.
1	Irrigation			20	Range		38	Residence Lights	
2	Water Supply			21	Hot Water Heater		39	Barn Lights	
3	Feed Cutter			22	Washing Machine		40	Shop Lights	
4	Silo Filler			23	Space Heater (Stove)		41	Dairy Lights	
5	Shop			24	Sewing Machine		42	Pump House Lights	
6	Wood Saw			25	Vacuum Cleaner		43	Poultry House Lights	
7	Milking Machine			26	Flat Iron		44	Yard Lights	
8	Cream Separator			27	Mangle		45	Garage Lights	
9	Refrigerator			28	Percolator		46		
10	Dehydration Fan			29	Toaster		47		
11	Ventilator Fan			30	Waffle Iron				
12				31	Table Grill (Stove)			MISCELLANEOUS	
13				32	Curling Iron		48	Electric Truck	
14	Total Number Motors			33	Immersion Heater		49	Horse Clippers	
15	Total H.P. Connected Load			34	Heating Pad		50	Sheep Shears	
16				35	Dish Washer		51	Brooder	
17	Number Acres Farmed			36	Portable Fan		52	Incubator	
18	Major Crop			37	Bell Transformer		53	Battery Charger	
19									

Other Uses and Remarks

Name

Address

CARD No. 29

POSTCARD QUESTIONNAIRE SENT TO RURAL CUSTOMERS IN CALIFORNIA

Digest of Electrical Literature

Hydro-Electric Development and Steam Equipment

Large Waterwheels for Japan.—J. MOSER. — The largest water turbines built in Europe were recently installed in the hydro-electric plant in Kanidera (Japan). Operating under a hydraulic head of 134 m., two sets of 40,000-hp. turbine generators were installed in this station. This article gives a description of the turbines only, the direct-connected generators having been furnished by an American concern. The wheels are of the vertical shaft spiral turbine type, consuming each 26,400 l. of water per second, supplied through two penstocks of 2 m. diameter each. The diameter of the runner is 2,300 mm. and is made of cast steel. Its normal speed is 300 r.p.m. The servo motor for the regulator is designed for a torque of 6,500 kg.m. The lubricating oil is supplied at 15 atm. pressure by an oil pump driven on one side by a small Pelton wheel, and on the other side by an induction motor. Johnson type ball valves are used as main closing valves immediately before the turbines. The turbine shaft measures 500 mm. in diameter.—*Elektrotechnische Zeitschrift*, April 2, 1925.

Factors Affecting Priming of Steam Boilers.—C. E. JOOS.—Tests were conducted to determine proper operating conditions in a specific boiler plant, the moisture content being found both by a throttling calorimeter and by a chemical method, using samples of trap discharges from steam headers. Investigations included the effect of rapid changes of load of high water, of frequent blow-downs and of chemical treatment to reduce solids. The results are reported. In the particular case it was cheaper to keep down the concentration by blowing down than by chemical treatment. — *Power Plant Engineering*, April 1, 1925.

Generation, Control, Switching and Protection

Theory of a Simple Electrostatic Alternator.—ALFRED W. SIMON.—The quantitative theory of a simple electrostatic machine—that is, a static machine which reverses its potential periodically—is given. The machine studied is one with four fixed inductors and four revolving carriers and reverses its potential once every revolution. Assuming that there is no leakage, the formulas for the potentials of the inductors are deduced, and, provided the potentials of two opposite inductors were initially zero and those of the other pair equal and opposite, they take a very simple form. If the inductors almost completely surround the carriers and if the inductors are relatively far apart, during every revolution the potential is theoretically quadrupled and at the same time reverses its sign. The machine is therefore self-exciting. Experiments made with an actual machine are described and are in good qualitative agreement with the theory.—*Physical Review*, March, 1925.

Mechanical Stresses in Busbar Supports During Short Circuits.—O. R. SCHURIG and M. F. SAYRE.—This paper gives a method of mathematical analysis that takes into account the possible vibratory motion of the busbars and supports. It concludes with a bibliography of thirty-four references. An abstract may be found in the ELECTRICAL WORLD report of the midwinter convention of the A. I. E. E., February 21, 1925, page 391.—*Journal of A. I. E. E.*, April, 1925.

Transmission, Substations and Distribution

Methods of Varying the Sensitiveness of a Ballistic Galvanometer.—MORTON MASIUS.—When a condenser is discharged through a ballistic galvanometer and then the same discharge is used with the same galvanometer when shunted, the ratio of the throws depends partly on the reduced charge going through the galvanometer and partly on the damping produced by the shunt. Formulas are deduced for this ratio, and a table is given of the shunt resistance required to reduce the throw to one-fifth or one-tenth of the original value, in terms of the resistance of the galvanometer and of the shunt that reduces the throw by half, determined experimentally.—*Physical Review*, Feb., 1925.

Corona.—At the Pacific Coast convention of the A. I. E. E. several papers were presented dealing with aspects of corona. Abstracts of these and of the subsequent discussion may be found in the ELECTRICAL WORLD report of the convention, November 1, 1924, on page 934. The discussion now published includes additional charts by F. W. Peek, Jr., and J. S. Carroll, showing losses under several different conditions.—*Journal of A. I. E. E.*, April, 1925.

Instrument to Measure Sudden Pressures.—E. LIENHARD.—On certain electrical and mechanical apparatus sudden pressure impulses occur at times, the magnitude of which is difficult to measure; but the exact knowledge thereof would be essential for a reliable design of these machines. As examples may be mentioned hydraulic turbines, oil switches, transformers, gas engines, etc. This short paper gives a description of a device that seems to accomplish this task. A short piece of metal tubing, closed at one end and slightly bent, is attached to the chamber wherein the pressure is expected. It will behave like a Bourbon tube in an ordinary pressure gage; that is, under pressure it will try to straighten out. A piece of resistance wire is in contact with the outer tube wall, and when there is no pressure this wire will be completely short-circuited by the metallic tube. Depending upon the pressure, the tube will curve more or less away from the wire, thus short-circuiting less or more of the length of the wire. By means of an oscillograph the resistance of this wire can be recorded, no matter how short the kick of the tube. An oscillogram is shown which illustrates the opening of an oil switch, giving at the same time a very exact record of the pressure exerted upon the switch tank by the gases evolved by the arc under oil. It is mentioned that a similar device in connection with a recording ammeter can be used advantageously for a remote indication of steady pressure, as on boilers, pumps, water towers and others. — *Brown, Boveri Mitteilungen*, April, 1925.

Three-Wire Direct-Current Distribution Networks — Comparisons in Cost and Operation. — HERBERT WILLOTT TAYLOR.—This paper discusses the application of several types of cable—single-core, three-core and triple-concentric—and several methods of laying—conduit, direct and solid—and endeavors to show that wherever it can be adopted the most satisfactory network is that composed of single-core, lead-covered cables, the feeders being drawn into conduits and the services laid direct. Specific information in the form of tables, charts and diagrams is given regarding maximum permissible current loading, costs and methods of construction. It should be stated that the values are in accordance with British usage—e.g., cable cross-sections in square inches and costs in pounds. To the American reader certain divergencies of practice in the two countries will be apparent, especially that relating to the grounding of the neutral. Following the paper there is a rather full report of its discussion at various centers of the institution. — *Journal of I. E. E. (England)*, April, 1925.

Units, Measurements and Instruments

Revised Tables of Phase-Angle Correction Factors for Use in Power Measurements.—C. T. WELLER.—An error occurs in measuring power in alternating-current circuits due to phase displacements in the instrument transformers and in the wattmeter. If the phase displacements or phase angles are known, the error may be corrected and the true watts obtained by multiplying the preliminary result in apparent watts by the proper correction factor taken from the revised tables published in this article. The tables differ from those previously published in the following respects: The few errors that have existed have been corrected; to facilitate interpolation three columns of correction factors have been added, and the tables have been sectionalized. Directions for using the tables are given, together with formulas and other data useful in correcting the results of power measurements. Modifications of the formulas to make them applicable to the results of energy measurements with watt-hour meters are also given.—*General Electric Review*, March, 1925.

Illumination

Street Lighting in Paris.—J. MARIAGE.—The present street-lighting systems of Paris are described in this elaborate article, which deals with gas illumination in the first installment and with electric lighting in the second. There are now 85 miles of streets equipped with electric lighting, with a total of 4,620 fixtures. During 1925

it is expected to add eighteen more miles. The present energy consumption for street lighting is nearly 7,000,000 kw.-hr., supplying 1,052 kw. for arc lamps and 1,738 kw. for incandescent lamps and producing a total of about 7,000,000 cp. On the average, fifty-seven gas fixtures are installed per kilometer of street, as compared with thirty-two electric fixtures. A large number of illustrations embrace isolux curves for the general street lighting, types of fixtures in use, connection diagrams for both types of lamps and a few night photographs of typical street-lighting units in actual use.—*Revue Générale de l'Electricité*, April 3 and 11, 1925.

Glare and Visibility.—M. LUCKIESH and L. L. HOLLADAY.—*The Meaning of Speed of Vision.*—PERCY W. COBB.—An abstract of these two papers may be found in the ELECTRICAL WORLD report of the annual meeting of the Illuminating Engineering Society, November 8, on page 1017.—*Transactions of I. E. S.*, March, 1925.

Heat Applications and Material Handling

Electric Arc Welding in the Steel Industry.—W. L. WARNER.—*Cutting Steel Mill Maintenance Costs with the Welding Arc.*—A. M. CANDY.—The first-named article gives numerous instances of the application of arc welding in various branches of the steel industry for salvaging worn or broken parts. The nature of the repair is described, and the quantity of metal used, the cost of the work, and the saving in time and expense by avoiding the need of purchasing new parts are stated. The second article gives additional information along similar lines and concludes with a list of work that can be arc welded.—*Iron and Steel Engineer*, March, 1925.

Motors and Control

Induction Motors for High Starting Torque and Low Starting Current.—M. LIWSCHITZ.—An induction motor with a squirrel-cage rotor develops a low starting torque and requires a starting current of several times its normal-run current. The author investigates in this very elaborate article the three available methods to design a motor of essentially short-circuit armature type but with high starting torque combined with moderate starting current. The first type considered is a motor where resistors rotate with the armature and where a centrifugal switch short-circuits these resistors after a certain speed has been exceeded, from which moment on the motor runs as an ordinary squirrel-cage type. The automatic switch and its contacts fail sooner or later, no matter how carefully designed. The second method is the Boucherot rotor with two short-circuited cages, one of high resistance and the other of low resistance, arranged on the same rotor core. By proper balancing of the electrical properties of these two cages a very wide variety of motor characteristics may be obtained. The third method, the eddy-current rotor, it is claimed, gives a simpler and still more flexible design. It is a rotor with very deep slots in which are placed conductors of great radial height. The peculiar flux distribution in such a case causes a very pronounced current displacement in these bars, which is responsible for an apparent increase of their resistance. The higher the frequency the higher the resistance, or, in other words, there is high resistance at start and decreasing resistance when the rotor gains speed. By proper choice of the height of the bars any desired characteristic may be obtained. By extending the ends of these high bars on either side considerably beyond the rotor very effective ventilator fins are formed for the cooling of the motor. Very detailed construction and test data are given for this type of motor.—*Siemens Zeitschrift*, March and April, 1925.

Electrophysics, Electrochemistry and Batteries

Insulation Failure.—W. D. OWEN.—The author points out the complexity of the insulation problem, due to the number of independent variables that may operate to produce failure. Taking up the voltage-time characteristic he shows by specific examples how the voltage that a sample will withstand indefinitely is likely to be overestimated when determined from short-time breakdown tests at various voltages plotted against time. If plotted, instead, against T the graph becomes a straight line that cuts the vertical axis at $T = \infty$ and thus shows directly the ultimate breakdown voltage. As to other variables, tables are given showing the reduction of dielectric strength with increasing frequency—e.g., to 0.73 at 500 cycles compared with unity at 60 cycles—the seemingly erratic effect on sundry materials of increasing the temperature in air and the marked reduction in their dielectric strength when heated in oil. The customary one-minute test on finished apparatus does not give the information sought and leads to a false sense of security. The writer also objects to routine pressure tests as more likely to cause ultimate failure than to give adequate protection.—*Electrician* (*England*), Feb. 20, 1925.

Soft X-Rays from Iron.—CHARLES H. THOMAS.—Soft X-radiation from a polished iron target bombarded by electrons from a heated filament produced a photo-electric current from a platinum semi-cylinder which was so placed that all the radiation from the target fell on it, it being protected from stray electricity by a system of radially disposed nickel vanes charged alternately positively and negatively. A vacuum of 10^{-6} mm. pressure or better was maintained. When the ratio of the photo-electric current to the thermionic bombarding current was plotted as a function of the exciting voltage, which was carried up to 900 volts, a number of breaks appeared. Thus about twenty-three radiation potentials were located at 7.3, 14.1, 16.5, etc., volts, and nine ionization potentials. The article includes a diagram and description of apparatus, charts showing the relation mentioned above, and a tabulation of critical voltages and the corresponding wave lengths as determined by the author, with citation of values by several other investigators.—*Physical Review*, March, 1925.

Traction

Berlin Suburban Electrification.—The first electrified section of the Berlin suburban lines—that between the Stettin station and Hermsdorf—was put in operation on August 1, 1924. Direct current at 800 volts is supplied through a third rail, after transmission at 30,000 volts, 50 cycles. To keep down electrolysis and reduce losses a balanced three-wire system is used on the busiest section. Operating units consist of a motor car and two trailers. The article under review gives data on rails, substations and rolling stock, also a map of the territory served.—*Electric Railway Journal*, March 28, 1925 (from *Verkehrstechnik*).

Electrification of the Chilean State Railways.—DAVID C. HERSHBERGER.—The scarcity of fuel and the abundance of available water power in Chile justify a broad program of railway electrification. The first zone, comprising a total of 233 track miles, is already under electric operation. The present illustrated article gives figures on the power possibilities of the country and describes the stations, equipment and 110-kv. transmission lines of the existing power system. It is the policy of the government to purchase power rather than to build and operate plants of its own. The system described, therefore, supplies power to other customers as well as for railway operation.—*Railway Review*, April 18, 1925.

Telegraphy, Telephony, Radio and Signals

Wireless-Telegraph Valve Transmitters Employing Rectified Alternating Current.—G. SHEARING.—This long paper, after a brief historical introduction, deals mathematically with the rectifying action of valves and the associated power loss, describes and discusses some of the types of transmitter circuits, presents a considerable quantity of experimental data and finally takes up the design of transmitting-valve electrodes. Although written with naval equipment primarily in view, the treatment is general. A table gives data on electrodes for standard designs of silica rectifying valves with molybdenum anodes capable of producing rectified power, with two-wave rectification, up to 50 kw. at 14,000 volts. The section on transmitter circuits includes vector diagrams of currents and voltages, normally and with low-resistance grid leaks, and discussions of grid coupling, of separate excitation, of coupled circuits for drying out wet aërial systems and of methods for reducing harmonic interference. That on design gives methods for estimating the main dimensions of valves for a given duty. Additional points are brought out in the discussion following the paper.—*Journal of I. E. E.* (*England*), March, 1925.

Metallic Polar-Duplex Telegraph System for Long Small-Gage Cables.—JOHN H. BELL, R. B. SHANCK and D. E. BRANSON.—This paper is descriptive, with circuit diagrams. An abstract may be found in the ELECTRICAL WORLD report of the midwinter convention at New York of the A. I. E. E., February 21, 1925, on page 393.—*Journal of A. I. E. E.*, April, 1925.

News of the Industry

World's Largest Turbine

Brooklyn Edison Company to Install Cross-Compound Unit of Approximately 100,000 Kva.

AN ORDER has just been placed by the Brooklyn Edison Company with the Westinghouse Electric & Manufacturing Company for the largest steam turbo-generator yet ordered anywhere in the world. This unit, which is for the new Hudson Avenue generating station, will have a rating of approximately 100,000 kva., or more than 50 per cent in excess of the central-station company's 62,500-kva. unit, also at Hudson Avenue, which is now the ranking machine for size.

The cost of the turbo-generator now ordered will be in the neighborhood of a million dollars. It will be a cross-compound machine, 67½ ft. long, 36 ft. wide and 24 ft. high. The entire unit will weigh 1,855,000 lb., the largest single piece of which is the low-pressure cylinder cover, weighing 175,000 lb. The speed of the rotors will be 1,800 r.p.m.

Steam entering the turbine will be introduced at 375 lb. and at 700 deg. F. The steam consumption rate will be slightly over 9 lb. per kilowatt-hour, and with four-stage bleeding the machine will produce a kilowatt-hour at a little under 11,000 B.t.u. Directly connected exciters will be used, and the generators will be 13,800-volt and directly connected to auto-transformers, stepping the voltage up to the Brooklyn Edison system voltage of 27,600. Generator cooling is to be of the recirculating type, with air coolers using condensate and well water.

Directors' Nominees Declared Elected by Institute

Prof. Michael I. Pupin of Columbia University, New York City, was elected president of the A. I. E. E. at the annual business meeting held on May 15 before the discussion of electrification reported on another page. The other officers elected (all directors' nominees) were: Vice-presidents, Arthur G. Pierce of Cleveland, W. E. Mitchell of Birmingham, Herbert S. Sands of Denver (re-elected), P. M. Downing of San Francisco and W. P. Dobson of Toronto; managers, M. M. Fowler of Chicago, E. C. Stone of Pittsburgh and H. A. Kidder of New York; treasurer, George A. Hamilton of Elizabeth, N. J.

These officers will constitute the board of directors for the next administrative year beginning August 1, together with the following hold-over officers: Farley Osgood, Newark; Harris J. Ryan, Stanford University, Cal.; Edward Bennett, Madison, Wis.; John Harisberger, Seattle; Harold B. Smith, Worcester; L. F. Morehouse, New York; H. W. Eales, St. Louis; H. M. Hobart, Schenectady; Ernest Lunn, Chicago; G. L. Knight, Brooklyn, N. Y.; William M. McConahey, Pittsburgh; W. K. Vanderpoel, Newark,; H. P. Charlesworth, New York; John B. Whitehead, Baltimore; J. M. Bryant, Austin, Tex., and E. B. Merriam, Schenectady.

The annual report of the board of directors showed a net increase in the membership during the year of 863, the total membership on April 30 being 17,318. In addition to the four general conventions of the Institute and the regional meeting, there were 934 meetings held by the local organizations in the principal cities and educational institutions in the country, the aggregate attendance at which was more than 76,000.

General Squier Again Loses in "Wired-Wireless" Suit

The decision of Federal Judge John C. Knox dismissing the action of Major-General George O. Squier, retired, former Chief Signal Officer of the United States Army, against the American Telephone & Telegraph Company for alleged infringement of patents covering a system of multiplex telephony and the carrier-current or "wired-wireless" devices perfected by him was affirmed on Monday of this week by the Circuit Court of Appeals. Judge Knox based his decision on the ground that General Squier had dedicated his device to the public, and the Circuit Court's affirmation, which was unanimous, is mainly based on this ground.

When the appeal was taken General Squier said that if he lost in the Circuit Court the case would be carried to the United States Supreme Court, because he deemed it important to determine the rights of scientific men in government service. Although the American Telephone & Telegraph Company was named as the sole defendant in General Squier's suit, the Western Electric Company, the Westinghouse Electric & Manufacturing Company, the General Electric Company and the Radio Corporation of America are concerned because of the fact that millions of dollars in the way of royalties are involved.

Connecticut Holding Company Seeks Incorporation

A bill organizing the Connecticut Electric Service Company has been reported to the Connecticut Senate. The incorporators are Randal Morgan, chairman executive committee Connecticut Light & Power Company, Waterbury; W. H. Putnam, a Hartford banker, and J. H. Roraback. This is a transmission and holding company organized to receive and distribute energy to utilities and is designed to facilitate the distribution of St. Lawrence power when it becomes available to Connecticut, according to a statement made by Irwin W. Day, vice-president Connecticut Light & Power Company, to the ELECTRICAL WORLD.

Good Convention at Omaha

First Day Devoted to Discussion of Rural Service and Women's Organization Work

RURAL electrification and the work of women's organizations bulked largely in the discussions at the third annual convention of the Middle West Geographic Division of the National Electric Light Association, which opened at Omaha on Wednesday, May 20. L. O. Ripley of Wichita, Kan., president of the division, called constant vigilance the price of good public relations and urged constant rather than spasmodic support of good-will activities, with first attention directed to employees.

That "utilities are farther along in the art of delivering service to the farmer than the farmer is in his ability to receive it" was the keynote of the rural electrification problem as seen by Arthur Huntington, Cedar Rapids, Iowa. Research has disclosed possibilities of energy consumption in kilowatt-hours per farm per year double that of a year ago, he said, and the education of the farmer in cost analysis and utility problems is creating much sentiment favorable to electrification among the political leaders of agricultural districts. Difficulties thus far encountered in carrying service to the farmer were cited by Prof. E. A. Stewart, University of Minnesota, as, first, improper rate structures; second, farm equipment unsuited to motor drive; third, unsatisfactory methods of financing.

FIVE POINTS IN RURAL SERVICE

Further discussion by Prof. E. E. Brackett of the University of Nebraska, Prof. Frank D. Paine of the Iowa State College and Dean Burnett of the University of Nebraska brought out these points: (1) Household equipment used in towns is generally suited to farms, with the exception of the range, water heater and refrigerator. Larger ratings and greater reliability are demanded in farm service, but confidence was expressed in the ability of manufacturers to meet these demands. (2) Use of electricity for power is of the first importance as providing an outlet for sufficient energy to justify the extension. (3) There is need for more complete co-operation between farm machinery and motor manufacturers to eliminate the necessity of makeshift speed reducers. (4) It is important that the farmer invest his capital in utilization equipment rather than in transmission lines. (5) A form of rate that will facilitate understanding by customers is another requisite. Dr. E. A. White, director Joint Committee on Relation of Electricity to Agriculture, spoke on the importance of farm electrification as a national economic movement and one requiring a sound basis if the farmer is to be really served and helped.

F. J. Hanlon, Mason City, Iowa, pre-

sented encouraging reports from the four state committees on public utility information, and a remarkable improvement was instanced in the character of legislation attempted in Missouri.

The presence of more than sixty woman delegates and the addresses of Miss Isabell Davie of Des Moines, Mrs. Virginia W. Collins, Omaha and Miss Sophia Malicki of Chicago impressed the convention with the prominent place women's organizations have taken in a few years and the opportunity these organizations give utilities for strengthening public relations.

Winners of recent state essay contests on public relations were guests of the convention, and the winner of the Missouri prize, Miss Ella Farrell of Maryville, presented her essay.

The convention continued through Thursday and Friday, when consideration was given to publicity, merchandising, power sales and management.

Crawford Avenue Station Ready

Formal Opening of First Portion of Commonwealth Edison Company's New Generating Plant Will Take Place Next Week—160,000 Kw. in Turbo-Generators Installed

CRAWFORD AVENUE, the new generating station of the Commonwealth Edison Company, Chicago, which is planned for a capacity of 600,000 kw. and may eventually attain even a larger rating, will be formally opened next Tuesday, May 26, in the presence of company officials and invited guests, special transportation and a luncheon at the plant having been arranged for the latter. The initial installation consists of three turbo-generators—one 60,000-kw. General Electric unit, one 50,000-kw. C. A. Parsons unit and one 50,000-kw. Westinghouse unit. In addressing stockholders recently, President Samuel Insull declared that subsequent units may be rated as high as 100,000 kw. each. Some features of this plant were described in the ELECTRICAL WORLD for October 18, 1924, page 834.

About 80 acres have been set aside for the present and future construction of the plant along the Chicago Drainage Canal, from which the water is bypassed for condensing purposes. The land provides storage for approximately 350,000 tons of coal, the ultimate daily consumption to be in excess of 7,000 tons every twenty-four hours.

Five Babcock & Wilcox boilers are installed for each turbo-generator, four of each group being normal boilers and one a so-called "reheat" boiler for reheating the steam after it expands in the high-pressure stage. The normal boilers have slightly more than 60,600 sq.ft. of heating surface, and the reheat boilers have nearly 23,000 sq.ft. of surface, divided between the reheating and superheating surface. The main boilers are designed for operation at 650 lb. pressure and a total temperature of 750 deg., although the turbines will operate at a throttle pressure of 550 lb. on the high-pressure side. Stokers of Babcock & Wilcox, Illinois and Coxe manufacture (chain grate) are installed and driven by Westinghouse adjustable-speed direct-current motors using belt drives. Forced draft for each boiler is furnished by two Buffalo turbo-conoidal blowers driven by Westinghouse adjustable-speed alternating-current motors. The reheat stokers are governed to regulate the temperature of the reheated steam.

Three distinctive types of turbines are installed, representing the latest thought and practice in turbine design, all being compound units. A feature common to all of them is the use of two vertical condensers under each low-pressure unit to permit efficient connection and prevent fouling of tubes by the circulating water. The C. A. Parsons turbine, which is a three-element, single-flow 50,000-kw. unit, has the intermediate and low-pressure elements in tandem with each of the three elements driving separate generators, rated at 16,000, 28,000 and 6,000 kw. respectively. The high-pressure element takes steam at its throttle at 550 lb., 750 deg. F.; the intermediate element at 25 lb. pressure, 730 deg. F., and the low-pressure element at 4 in. vacuum. Both the high and intermediate elements operate at 1,800 r.p.m. and the low-pressure element at 720 r.p.m. The 60,000-kw. General Electric turbine has two elements on separate shafts with impulse blading throughout, the high-pressure generator being rated at 17,000 kw. and the low-pressure generator at 43,000 kw. The high-pressure turbine receives steam at 550 lb. pressure and the low-pressure turbine at 110 lb. pressure, the elements operating at 1,800 r.p.m. and 1,200 r.p.m. respectively. The 50,000-kw. Westinghouse turbine is a two-element unit with Parsons blading throughout, the last two rows of blades having divided exhausts to reduce the length of the low-pressure blading. The high-pressure and intermediate-pressure stages are one-shaft, driving a 20,000-kw. generator at 1,800 r.p.m. The low-pressure element, which is of the double-flow type, drives a 30,000-kw. generator at 1,800 r.p.m. The high-pressure element receives steam at 550 lb. pressure and the low-pressure element at 105 lb.

From an electrical point of view, the isolation of phases and other provisions for handling the concentration of power available are the chief features.

Long Island Electrification Completed

The completion of the electrification of another section of the Long Island Railroad—from Jamaica (within the limits of Greater New York) to Babylon, on the Montauk division of the railroad)—was celebrated on Wednesday, May 20, by a celebration, held at Babylon. Public officials and company executives made speeches, and thousands of visitors were present. Old commuters were guests of honor.

Practical A. S. M. E. Papers

Hydraulic and Steam Generating Equipment and Pulverized Fuel Are Discussed at Milwaukee

VARIOUS phases of hydraulic and steam generation of power were discussed before the opening sessions of the spring meeting of the American Society of Mechanical Engineers at Milwaukee May 18 to 21. The subjects ranged from hydraulic turbine and plant design and operation down through powdered-fuel combustion, steam-turbine development, condensing water and design of pipe covering to analysis of plant performance and comparison of actual with theoretical performance for a specific plant.

Public hearings were afforded on some proposed rules for the care of power boilers and the power test codes, but, although some written and oral suggestions for changes were presented, the work of the committees on these subjects remains about as submitted. The rules on care of boilers are intended to assist operators in maintaining safe conditions as distinguished from inspection of construction.

Proposed standards designed to cover flanges and flanged fittings for maximum pressures up to 900 lb. were submitted at an executive meeting. A proposed code for identification of piping was also submitted.

Mechanical problems of hydraulic turbine design and other matters affecting hydro-electric plants were the subjects of papers by William N. White, Allis-Chalmers Manufacturing Company; E. A. Dow, New England Power Construction Company, and F. A. Allner, Pennsylvania Water & Power Company. Discussion of these topics was participated in by engineers from all parts of the country.

Prof. A. G. Christie, L. V. Andrews, W. J. Wohlenberg and Donald G. Morrow presented the papers dealing with pulverized fuel, which were discussed by Col. C. G. Spencer of McClellan & Junkersfeld, H. W. Brooks of the United States Bureau of Mines, C. W. E. Clarke of Dwight P. Robinson, Inc., and E. G. Bailey.

Denver Franchise to Public Service of Colorado Defeated

Denver electors on Tuesday, May 19, overwhelmed by a two-to-one vote the proposed new electric and gas franchise for the Public Service Company of Colorado, which had been submitted in the regular spring municipal election at the request of the company, although its present franchise has another year to run and a final decision cannot be made until some time next May. The vote was 30,842 against and 15,834 for.

The company, as previously told in the ELECTRICAL WORLD, had prepared a new system of establishing rates on a sliding basis taking into consideration cost of service arrived at by a method similar to the cost accounting standards of the Department of Labor. This method, the company estimates, would bring an initial reduction of 5 per cent in electric and 10 per cent in gas rates, but various committees which had examined the proposed franchise opposed it.

Menlo Park Fittingly Commemorated

Scene of the World-Changing Labors of Thomas A. Edison Made Site of Tablet Erected in His Honor Under the Auspices of the Edison Pioneers

LAST Saturday, May 16, the members of the Edison Pioneers and many others connected with the electrical industry or interested in the fame of Edison journeyed to Menlo Park, N. J., where from 1876 to 1882 the inventor had his shops and where the incandescent lamp was invented and brought to the commercial stage, approximately 132,000 bulbs being manufactured there. The occasion was the unveiling of the bronze tablet shown in the accompanying illustration, which bears this inscription:

ON THIS SITE
1876-1882
THOMAS ALVA EDISON
BEGAN HIS WORK
OF SERVICE FOR THE WORLD
TO ILLUMINE THE PATH OF PROGRESS
AND
LIGHTEN LABOR FOR MANKIND

THIS TABLET IS PLACED BY THE EDISON PIONEERS TO ATTEST THE GRATITUDE OF THE INDUSTRIES HE DID SO MUCH TO CREATE

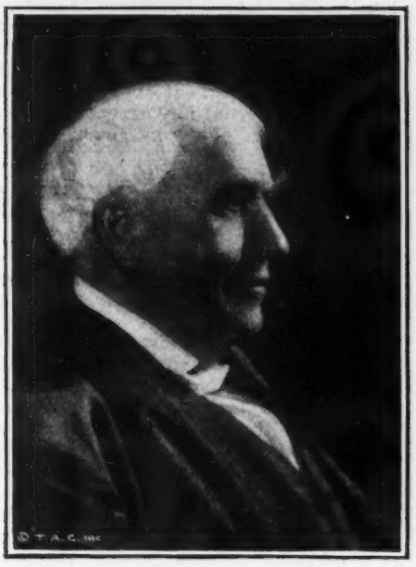
DEDICATED, MENLO PARK, N. J. MAY 16, 1925

The address of welcome to the six hundred persons assembled was made by Charles L. Clarke, president Edison Pioneers. Mr. Clarke said, in the course of his remarks, addressing himself directly to Mr. Edison, who was the chief guest:

"Because of the supreme utility of your work begun here, no place could more befit this memorial than the spot on which it stands—the site of your home and nearby laboratory at that time, now facing the nation's Lincoln Highway, that millions of Americans, passing, may stop and read, and in feeling proud of the transcendent achievements of another American may gain inspiration to try in some way to do more for the welfare of their fellow men."

John W. Lieb, vice-president New York Edison Company, in dedicating the tablet, which, immediately following his speech, was unveiled by Mrs. Edison, spoke in part as follows:

"Here on this spot many inventions were made, many attempts launched to wrest from nature her secrets, and many ingenious combinations were devised to bring the new agent—electricity—into subjection and make of it the docile servant of man. For from the beginning this potent force was first envisaged by Edison as capable of a limitless extension of service, a universality of application which would introduce a new economic factor into our lives, and the mere pressing of a button would place every man, woman and child in a new relation to their environment, vastly increasing their productive capacity, diminishing the drudgery and manual labor required in the home, lighting the way and lifting the load of mankind everywhere. This bold conception of the universal application of electrical energy for all purposes, but particularly for light, heat and power, required for its consummation a multitude of inventions singly and in combination, the placing of existing types of mechanism in new relations, and the production of new types to secure hitherto unattained results. The supreme confidence and indomitable spirit with which the goal was relentlessly pursued must remain for all time a cause for wonder and admiration. These circumstances justify the erection of this memorial and its dedication to the memory of the great creative master mind—Thomas Alva Edison—and his faithful and loyal coworkers, true pioneers, who by blazing new trails of industrial progress have brought to their fellow men greater happiness and comfort and well being."



To my old friends and associates of the pioneer days
Thos A Edison.
May 16 1925

EDISON'S LATEST PHOTOGRAPH, DISTRIBUTED AT CELEBRATION

THE MENLO PARK MEMORIAL STONE

The Governor of New Jersey, George S. Silzer, and the president of Princeton University, Dr. John G. Hibben, followed Mr. Lieb. Governor Silzer told of the pride felt in Edison by the people of New Jersey, and Dr. Hibben, telling how as an undergraduate he had visited Menlo Park and seen one of the first lamps there made to burn, dwelt on the "mysterious manner" in which light has led to power, not only in the natural world but in the moral and spiritual striving of mankind.

Edwin W. Rice, Jr., honorary chairman of the board, General Electric Company, after alluding to the earlier inventions of Edison, his contribution to telephony, the phonograph, his alkaline storage battery and his part in the motion-picture art and in the development of chemistry, said:

"It was here in Menlo Park that Edison conducted those remarkable researches and experiments which ended in giving the world not only the incandescent lamp, but a complete system of generation, regulation and measurement of electric light and power upon which has been based the development of our modern central-station industry. The result has been to enable electrical energy to be used on a large scale by the general public. Viewed from the standpoint of today, Edison's achievements of that early period appear almost miraculous. They have stood the test for forty years of the most extensive and intensive technical and commercial development of the electrical industry. His system of distribution of electrical energy on the multiple or parallel plan has survived and is the only method by which an unlimited amount of electrical energy can be generated and distributed over an unlimited area in a practical and commercial manner. This simple method seems obvious to the present generation of engineers. It was by no means obvious in 1882. The series system of distribution had many powerful advocates at that time, but Edison's foresight and practical wisdom have been fully vindicated, as the multiple system is universal today. It is employed in the low-tension direct-current network for lighting of our cities, in the operation of our trolley cars, on electrified steam roads, and in the distribution of electricity at the supervoltages and superdistances of our present day hydro-electric and central-station developments. Moreover, the incandescent lamp in all its essential features, with its bulb of glass, filament of high resistance, screw base, voltage and candlepower, is substantially as Edison gave it to us forty-four years ago. It has been improved in efficiency and in life, but otherwise remains the same wonderfully simple, practicable device."

The closing address was made by Samuel Insull, president Commonwealth Edison Company, Chicago, who was intimately associated with Mr. Edison for many years, at first as his private secretary and confidential adviser and later in the direction of his manufacturing enterprises. Mr. Insull, responding for Mr. Edison, outlined his early connection with the inventor and the light and power industry and dwelt upon its enormous expansion.

Tennessee Licenses Asked

Companies Associated with Alabama Power Wish to Build Two Dams Below Muscle Shoals

APPLICATIONS for licenses covering two sites on the Tennessee River below Muscle Shoals have been filed with the Federal Power Commission. The Mississippi Power Company desires to build a dam 55 ft. high and approximately one mile long in the Tennessee River at Parker's Landing, near Iuka, Miss. The Muscle Shoals Hydro-Electric Company wishes to construct a 50-ft. dam across the Tennessee at Riverton, Ala. This dam would be just below the mouth of the government canal at Colbert Shoals. Both companies are associated with the Alabama Power Company. The two sites are 10 miles apart. The Iuka dam would produce 66,000 hp. of primary power. An initial installation of 100,000 hp. is proposed. At Colbert Shoals the primary power is estimated at 60,000 hp., while 90,000 hp. would be installed there.

The power from these two sites will be needed for public utility use in Mississippi and western Tennessee, including Memphis, even if all of the power at Muscle Shoals should be made available for distribution, a representative of the companies has informed the commission. It is also stated that the applicants are prepared to begin construction work immediately as they already have acquired the necessary riparian rights and have made the preliminary engineering studies. The two projects call for the ultimate expenditure of $22,000,000.

A precedent has been found which has caused a reversal of the previously held view that the Acting Secretary of War may not serve as a member of the Federal Power Commission. It had been assumed that the duties of members of the Federal Power Commission could not be performed by those acting in their stead. Assistant Secretary Davis of the War Department and Assistant Secretary Finney of the Interior Department have sat with the commission during the absence of their principals, but they have refrained from voting. Since the next meeting of the Federal Power Commission is to be a very important one, the advisability of settling the point was apparent.

Trans-Mississippi Line at St. Louis Goes Into Service

Commercial service over the 35-mile million-dollar high-tension transmission line extending from the Cahokia plant of the Union Electric Light & Power Company of St. Louis to the plant of the Pittsburg Plate Glass Company at Crystal City, Mo., was inaugurated last week. In general construction this line is similar to the line from the Keokuk Dam to St. Louis. It crosses the Mississippi River at Crystal City over a span more than a mile long, one of the longest in existence. On the Illinois side the supporting tower is nearly 300 ft. high, and that on the Missouri shore is 110 ft. above the river bluffs. The cables sag to about 75 ft. above high water. There are six cables in the line, the weight of each above the river being about 15,000 lb. and the strain on each tower 200,000 lb. The stretch over the river is without a splice.

In the substation of the glass-making company are two three-phase circuit breakers each weighing 60,000 lb. and with a rupturing capacity of 1,500,000 kva. The Union Electric Light & Power Company has contracted to purchase the Crystal City distribution system and will replace the present 250-volt direct-current service with the standard alternating-current service, involving the changing over of all motors and other appliances. The ten-year contract of the company with the glass works involves $6,000,000 and calls for the delivery of 50,000,000 kw.-hr. annually. It was made after an exhaustive investigation by the industrial customer had convinced it that the factory would be better served from the central station than it could be by building an electric power house of its own. Officials of the power company say that this is the largest initial contract ever made for power from a central station.

Standardizing Railroad Electrification

Executives Speaking Before A. I. E. E. Show How a Universal System Will Reduce Cost and Losses—Power Should Be Purchased —Manufacturers Pledge Co-operation

RAILROAD electrification from the executive standpoint was discussed by leaders in the electrical industry before a large audience at the annual meeting of the American Institute of Electrical Engineers in New York on May 15. In a discussion written by Secretary of Commerce Hoover and read at the meeting the necessity for standardization of electrification so far as it pertains to fundamental principles was emphasized. In this way, Mr. Hoover said, capital cost can be reduced and losses kept at a minimum. He urged that the fundamentals of standardization be so applied that equipment will be interchangeable and that the voltage frequency and other electrical characteristics will permit the railroads to purchase power from the light and power systems in all parts of the country. Standardization and co-operation started now will save millions in the future, declared the Secretary.

SWOPE AND HERR AGREE

Gerard Swope, president of the General Electric Company, said that the saving of coal each year if only one-half of the railroad mileage of the country were electrified would be approximately 40,000,000 tons, which at prevailing market prices would amount to $120,000,000. The steam locomotive, he thought, will endure for many years and will be improved, but its power will be limited by the size of the locomotive boiler and firebox and its inherently low fuel economy, while the electric locomotive and the central station from which it derives its power are not restricted in their capacity.

Mr. Swope pointed out that there was still a difference of opinion in the minds of prominent engineers as to the relative merits of alternating current and direct current to meet the varying conditions of transportation service in the United States. France and England have adopted direct current nationally, while in Germany and Switzerland alternating current has been adopted. However, this difference is far less important than the difference between either system and steam drive. Just as in this country there is a standard gage for tracks, standard couplers and standard brakes, in order to make equipment interchangeable, so, Mr. Swope hoped, a national electrical standard will be adopted which will permit the mobilization of resources for the greatest economic development of the country. A common system will save millions in equipment, and standardization will also aid the growth of the light and power system. It will increase the ease of raising capital and reduce the amount of capital needed. The speaker pledged the assistance of the General Electric Company in developing whatever system is adopted as standard.

P. S. Clapp of the Department of Commerce urged that standardization in railroad electrification should proceed at once in order to facilitate transportation. Standardization, he said was a public obligation and required the closest co-ordination of the railroads and the light and power industry.

E. M. Herr, president of the Westinghouse Electric & Manufacturing Company, thought that public sentiment had begun to favor giving the railroads a fair hearing. During the war, he said, government operation caused stagnation in railroad progress and unduly stimulated other means of transportation. The time now appears ripe for progress to be resumed, and he pointed out the many advantages of the electric locomotive, particularly in terminal service, suburban service and on heavy-grade divisions of trunk-line roads. Electrical engineers and electrical manufacturers, said Mr. Herr, are ready to do the work required for the electrification development, and the particular system to be used in any given case is a matter for engineering study. Once the system is determined, there is more than one electrical manufacturer ready to do the work.

The United States, Mr. Herr continued, is not the leader in railroad electrification. In 1924 2,351 electric locomotives, aggregating 4,259,000 hp., were under construction in the world, of which 1,446 were alternating-current and 905 were direct-current. Of the total 465 were being built in this country, with an aggregate horsepower of 862,000, while in Italy there were 504 being built with an aggregate horsepower of 1,290,000, in France 366 locomotives with 384,000 hp., in Germany 304 with 518,000 hp., and in Sweden 214 with 384,000 hp. A recent development is the production of an electric locomotive which permits the use of single-phase, three-phase or direct current of any voltage desired. This Mr. Herr considered a long step toward possible free interchange of

railroad equipment. He, too, urged that power be purchased from the light and power companies.

The fact that manufacturers of electrified equipment for railroads are now ready to construct any type desired is of great interest to railroad executives, C. H. Markham, president of the Illinois Central Railroad, declared. This is a great contribution to the cause of electrification which should increase the capacity of the transportation systems and, if electrification is successful, decrease the cost per unit of service and per unit of investment. Mr. Markham thought there are great possibilities along these lines. In his opinion each railroad property is an individual problem for joint study, and the solution of one railroad problem is not necessarily the solution that can be applied to all railroads or even all parts of one property. Simplicity must be borne in mind and the equipment must be capable of operation and maintenance by the present railroad forces.

Robert Cary, general counsel of the New York Central Railroad, said that the problem confronting the railroads is not an ideal one, but a concrete one. The transportation companies are living from hand to mouth and not earning much money. The railroad man also doubts whether when transportation business falls off an electrified system will permit the same economies in curtailing plants that are permissible with steam equipment. However, he said the prospects of electrification are made much brighter by the plan to have the specialists agree among themselves and then tell the railroad people the consensus of opinion as to the best system to be used on a particular system or part of a system. This Mr. Cary called the only logical approach to electrification.

Bonbright Competition Closes with 432 Papers Submitted

Four hundred and thirty-two papers were in the hands of Bonbright & Company, Inc., New York, last Monday night, when the competition for the $10,000 in prizes offered by that firm for the best ten-year reviews of the electric light and power industry closed. These reviews, it will be remembered, were to be written as of the date January 1, 1930, they being thus partly historical and partly prophetic in nature. The first prize is $5,000, the second $1,000, the third $500, and there are ten of $250 each and ten of $100, or a total of twenty-three awards. In addition, a further prize of $10,000 is offered by the American Superpower Corporation, to be awarded five years hence to the writer of the paper making the most accurate predictions for the four years and seven months to come. Probably no contest of the kind ever aroused greater interest in the industry and related circles, as is evidenced by the large number of participants, notwithstanding the labor involved in preparing a paper of from 5,000 to 10,000 words. The Bonbright company hopes to be able to announce the winners during the course of the San Francisco convention of the National Electric Light Association next month.

Power Export Brings Debate at Ottawa

In the Canadian House of Commons on May 14 the power export question was debated at considerable length. H. H. Stevens, former Minister of Trade and Commerce, expressed the opinion that if the export of power were permitted to continue the result would be that there would be established in certain places south of the line factories with vested interests dependent upon the receipt of power which they would claim later on was contracted for in perfect good faith. Then it would become a question of dispute between the two governments as to whether or not the power could be cut off. "I think we should serve notice to the world," said Mr. Stevens, "that we expect persons who want our power to put their factory beside the power." Mr. Stevens went on to oppose specifically the exportation of power from Carillon except on an annual license basis.

Thomas Low, Minister of Trade and Commerce, took an opposite view of the question. He said: "What we must ask ourselves is: Are we to allow dollars to flow away from us for the next twenty or twenty-five years until such time as the industries are ready to establish in this country? If we are able to export a small quantity of power above what is necessary for home purposes, it is possible to develop a valuable business in the interests of our people. I am not much impressed with the argument that vested rights may be established and that we shall not be able to get away from them when we like."

Sir Henry Drayton, former Minister of Trade and Commerce, denied that there was a surplus of power, and G. P. Graham, Minister of Railways, was strongly of the opinion that any government in Canada ought to go very slow in approving of the export of power in any great quantity.

A tentative contract, as yet unsigned by the government, dealing with the export of electric power to the United States from the proposed Carillon dam in the Ottawa River was, however, tabled in the Canadian House of Commons on May 18. It is undated, apparently drawn up some time in 1924, and would give the development company the right to export all power developed over 100,000 hp., which is the quantity suggested for Canadian users. One clause would provide that if sufficient power is not available at Carillon for the company's commitments, other arrangements would be made to supply the deficit.

The contract is based on the original leases granted to Crawford Ross of Ottawa in 1907 and to the National Hydro-Electric Company, Ltd., of Montreal in 1921. The latter name is changed to the "Carillon Industrial Corporation of Ottawa," which would be required to spend $500,000 of the proposed expenditure this year. The original lease gave the company the right to dam the waters of the river below the present Carillon dam to a height of 120 ft. for the development of power. The rentals now proposed are $500,000 a year from January 1, 1929, to January 1, 1931; $75,000 for the next year, $100,000 for the third year, $125,000 for the fourth year and $150,000 a year from 1934 to 1964.

International Joint Commission and Grand Falls

The first sessions of the final hearings by the International Joint Commission on the application made by the New Brunswick Electric Power Commission for permission to construct and operate a great hydro-electric power project at Grand Falls on the St. John River were held in Montreal on May 15 and 16. At these sessions the United States was represented by Attorney G. V. Hackworth and the State of Maine by Attorney-General R. W. Fellows. Mr. Fellows asked that the development be required to reserve a definite proportion of the power for use on the American side, such proportion to be based on the relation of the descent of the river along the international boundary to the natural head of water at the falls, which is a matter of 17 ft. to 72 ft. Mr. Hackworth urged that the amount of power assigned to Maine should be exempt from any Canadian tax and asked the appointment of a supervisory commission to see that the New Brunswick Development Commission did not violate any American rights and to pass on the question of what should be a reasonable and fair payment for power exported to Maine.

Eugene Lafleur, counsel for the province of New Brunswick, urged that the development of the water powers at Grand Falls does not affect the sovereignty of Maine or of the United States, but only the proprietary rights of the individuals in Maine whose property is adversely affected by the works in New Brunswick. The contention put forward by the United States representatives was that rights of the State of Maine as distinguished from proprietary rights were involved and should receive compensation or indemnity.

The commission adjourned without coming to any conclusion. It will reassemble in a month and may grant a conditional order to permit New Brunswick to proceed with the development.

Los Angeles to Vote on Colorado River Proposition

A bond issue of $2,000,000 "for the acquisition, construction and completion by the city of Los Angeles of a certain revenue-producing municipal improvement, to wit, waterworks, including the acquisition of necessary lands and rights-of-way and the construction of tunnels, canals, conduits and other necessary works in connection with an aqueduct system for obtaining an additional water supply for said city and its inhabitants from the Colorado River," will be submitted to the voters of Los Angeles at the municipal election on June 2.

Indorsement of this proposition is believed to be the first step in the efforts of municipal water and power advocates in Los Angeles to bring about the construction of Boulder Canyon dam and the generation of power on the Colorado River for distribution to the municipalities of southern California.

Denounces Gregory Report

Ontario Hydro Commission Disputes Its Conclusions—Defends the Nipigon Development

VIGOROUS denunciation of the report of the Gregory commission on the operation of the Ontario Hydro-Electric Power Commission was issued by the latter body on May 15. The report of the Gregory commission was filed with the Ontario government in March, 1924, and was summarized in the ELECTRICAL WORLD for March 22 of that year, page 590. In the Hydro commission's just-published memorandum the assertion is uncompromisingly made that the Gregory report is "permeated by incorrect and misleading statements," particularly concerning the relation that certain conclusions reached and comments made by the Gregory commission bear to the evidence submitted at its hearings.

Respecting the suggestion that the Hydro-Electric Power Commission had sought to evade legal responsibility for certain estimates by failing to make the estimates a part of the bylaw or publishing them with it, the Hydro commission says it is absurd to make such an accusation in view of the fact that the statute of the Province of Ontario provides that there could be such contingency.

With reference to the Gregory commission's criticism of the choice of the Nipigon River development in preference to the Dog Lake site on the Kaministiquia River, the Hydro commission challenges the accuracy of the statement that "the commission was under no obligation to go to Nipigon." The inadequacy of the power available at Dog Lake to meet the probable demands, the engineering and constructional disadvantages of the site, the desirability of making such a power development in the Thunder Bay district as would encourage development of the natural resources and stabilize the industries and communities that would become dependent upon power as a prime industrial necessity, and a lower cost per horsepower for the ultimate development at Nipigon are the main reasons given by the Hydro commission in contending that it was imperative to develop the Nipigon River power.

The Hydro commission in concluding its rejoinder says: "The statements in the foregoing discussion, although presented with full assurance, are not advanced in a controversial or dogmatic spirit. They are presented for the calm and candid consideration of those interested in the work intrusted to the administration of the Hydro-Electric Power Commission of Ontario and, moreover, are submitted under the strong persuasion of their truthfulness."

Program of Electric Power Club Is Ready

Five "feature addresses" in addition to the routine proceedings of the section and division meetings will lend variety to the annual convention of the Electric Power Club to be held at The Homestead, Hot Springs, Va., from Monday to Thursday of next week, May 25 to 28. President A. H. Timmerman, vice-president Wagner Electric Corporation, St. Louis, will speak on "Potential Possibilities of the Power Club"; Clarence L. Collens, 2d, president Reliance Electric & Engineering Company, Cleveland, on "Executive Control of a Small Business"; Hugh A. Brown, on "Publicity for the Club" (answers to a questionnaire); Gilbert A. Montague on "The Federal Trade Commission — Past, Present and Future," and C. H. Roth, president Roth Brothers & Company, Chicago, on "Figuring the Cost of Special Apparatus."

Among the many reports will be those of Clarence L. Collens, 2d, on the Electrical Manufacturers' Council, of E. R. Harding on business policies, of J. M. Hipple on technical standardization, of R. W. E. Moore on casualty and fire prevention and of A. H. Moore on a terminal marking standard.

Supply Jobbers Formulate Program for Hot Springs

Committee meetings on June 1 and 2 and general meetings of the association in the afternoon and evening of June 3 will fill the first three days of the convention of the Electrical Supply Jobbers' Association to be held at Hot Springs, Va., next month. On Thursday, June 4, there will be a morning session at which Albert Wahle, president of the Albert Wahle Company, New York, will speak on "The Distribution of Lighting Fixtures" and W. J. Canada, retiring director of engineering, N. E. L. A., on "Codes and Ordinances." On the evening of that day Alvin E. Dodd, manager domestic distribution department, United States Chamber of Commerce, will speak on "The Present Confusion of Distribution and Some Ways Out," and W. R. Herstein, vice-president Wesco Supply Company, Memphis, on "Comparison of Electrical Supply Dealers' Business with Other Lines." Earl E. Whitehorne, commercial editor of the ELECTRICAL WORLD, and Joseph A. Fowler, president of the Association of Electragists International, will be other speakers at the convention.

Northern Ontario Power Dispute Finally Adjusted

An agreement has finally been reached and signed between the Hollinger Consolidated Gold Mines, the Abitibi Power & Paper Company, Ltd., and the Northern Canada Power Company, Ltd., whereby Abitibi takes over from Hollinger the Island Falls power development of the latter company. The Abitibi company has also entered into a satisfactory contract with the Northern Canada Power Company to supply power to Hollinger for all its requirements up to 20,000 hp. The terms of the settlement have not been made public, but it is understood that Hollinger recovers fully its expenditures on the Island Falls plant. This deal has been hanging fire for many months and will adjust a triangular dispute that has long been in litigation. Attempts had been made on many occasions to get the principals together, and finally at the suggestion of the Ontario government they agreed to arbitrate their differences.

The Island Falls power interests of the Hollinger Consolidated consist of a plant designed to provide two units of 12,500 hp. each, with provision for additional units. It has several million dollars of Hollinger's money tied up in it, including a transmission line, which has been estimated to be worth about $750,000.

High-Tension Conference Meets at Paris Next Month

The date for the third session of the international conference on large electric high-tension systems (Conférence Internationale des Grands Réseaux Eléctriques à Haute Tension), the program of which was printed in the ELECTRICAL WORLD for November 1, 1924, page 966, has been officially set as June 16-25 inclusive. As previously, the conference will be in Paris, where the general secretary, J. Tribot Laspière, may be addressed at 25 Boulevard Malesherbes.

Acceptances already received assure the participation of twenty-three nations in the conference, as compared with twenty in 1923 and twelve in 1921. Italy will send twenty-seven delegates, Russia eighteen, England fourteen, Spain twelve and Holland eight. On May 1 a hundred foreign representatives had been registered and more than that number from France. Forty papers have been received by the secretary, and fifteen others are promised. These papers will all be open to discussion.

The opening ceremony will take place on Tuesday, June 16. There will be technical sessions on June 17, 18, 19, 22, 23 and 24 and a closing ceremony on June 25. Saturday and Sunday, June 20 and 21, will afford a period for rest and excursions.

Among questions which, at the request of members of the conference, will be specially dealt with are communications by wireless telephony between central stations, disturbing influences of high-tension lines on telegraph and telephone wires, earthing of the neutral, specifications for the supply of oil for use in transformers and circuit breakers, standardization of voltages (preparation of work of International Electrotechnical Commission), accidents in central stations or on lines, international regulations for high-tension lines, protection of towers against rust, standardization of test voltages, specifications for high-tension cables and methods of measuring dielectric losses, influence of the soil on strain insulators and suspension insulators, regulation of power systems operated in parallel when one of them delivers amounts of energy agreed upon in advance to all others, power-factor improvement, junction of big power systems of different frequencies, and comparative service of large steam and water-power plants.

M. Legouez of France is president of the conference, of which the honorary presidents are André Blondel of France and C. O. Mailloux of the United States. There are vice-presidents from Switzerland, Holland, Sweden, Italy, Belgium and Great Britain.

Briefer News

Bryson Plant on Ottawa Starts Up.—The new plant of the Ottawa River Power Company at Bryson, Quebec, about 30 miles from Ottawa, has commenced operations with the first unit of 25,000 hp. installed. The plant has been constructed with an ultimate production of 75,000 hp. in view.

Power Sites in Oregon Are Applied For.—Robert J. Simpson, Salem, Ore., has applied to the State Engineer for permission to appropriate water from the following streams in Marion County: From Marion Fork for the development of 34,090 hp., from Permelia Creek and Whitewater Creek for the development of 22,158 hp. and from North Santiam River for the development of 20,443 hp.

Beloit (Wis.) Utilities May Change Hands.—Negotiations are reported to be under way for the purchase by the Northwest Utilities Company of the electric, gas and water properties of the Beloit (Wis.) Water, Gas & Electric Company. Although details are lacking, a responsible official of the Northwest Utilities Company expects that the deal will be consummated within the next two months and the properties taken over.

Rumor of Consolidation Denied at Baltimore.—Herbert A. Wagner, president of the Consolidated Gas, Electric Light & Power Company of Baltimore, has issued a denial of insistent rumors that a plan is under consideration for consolidating that company and the Pennsylvania Water & Power Company. "No plan," Mr. Wagner says, "is under consideration or under contemplation for a consolidation or a closer affiliation with these or any other Baltimore or out-of-state interests."

High-Tension Lines from Binghamton Nearing Completion.—Electric transmission lines connecting the Binghamton Light, Heat & Power Company, a subsidiary of the General Gas & Electric Corporation, with the Afton-Windsor Light, Heat & Power Company, Inc., and the Susquehanna County Light & Power Company, properties acquired last year, are nearing completion. When the lines are finished electric power will be supplied by the Binghamton station, through the two new subsidiary companies, to additional sections of Broome and Chenango Counties, N. Y., and Susquehanna County, Pa.

More Transmission Lines for Oklahoma.—Several of the smaller cities of Oklahoma will be connected with electric transmission lines within the next few weeks. The Oklahoma Power Company is constructing an electric transmission line from Henryetta to Dustin and is building a distribution system in the latter town. Dustin was supplied by a privately owned plant which was destroyed by fire several months ago. The Chickasha Gas & Electric Company has material on ground for extension of its line from Cyril to Apache. The Inland Utilities Company has completed an electric transmission line to Rocky and Sentinel and is constructing a line to Gotebo and Mountain View. These towns, which have municipally owned light plants, will be served by the Inland Utilities Company from its plant at Hobart.

Adirondack Light & Power Buys Two More Plants.—Sale of the Warrensburg Electric Light Works, owned by M. Leigh Runner, and the Bolton Light & Power Company, owned by Henry G. Knoblauch, to the Adirondack Light & Power Corporation has been approved by the Public Service Commission of New York. The Warrensburg plant holds franchises in the towns of Warrensburg and Caldwell, and the Knoblauch plant serves in the towns of Bolton, Chester, Hague and Horicon. All these places are in Warren County. The commission fixed the value of the Warrensburg plant at $60,296 and of the Knoblauch plant at $11,560.

East Central Division, N. E. L. A., Now a Going Concern.—Chairmen of standing committees of the East Central Division, National Electric Light Association, are preparing their reports for the annual convention in Breakers Hotel, Cedar Point, Ohio, on July 14-17. This convention will be the first held under the full auspices of the East Central Division, and more than one thousand are expected to attend. At last year's convention of the Ohio Electric Light Association, now dissolved, more than six hundred attended. This year, in addition to Ohio, West Virginia and Kentucky will send big delegations. The committee has decided to continue the exhibit.

Iowa Electric Light Association to Meet at Waterloo Next Month.—Two hundred and fifty men connected with the electric light industry in Iowa are expected to attend the state convention of the Iowa Electric Light Association in Waterloo on June 3 to 5. Elaborate plans are being made for the business sessions and social features. Speakers of prominence have been engaged and there will be round-table discussions. Manufacturers will be well represented in the convention. Headquarters will be at the Hotel Russell-Lamson.

New York Edison System Wants to Go to 115 Volts.—The New York Edison Company, United Light & Power Company, New York & Queens Electric Light & Power Company and Yonkers Electric Light & Power Company have requested the New York Public Service Commission for an order prescribing 115 volts as the standard service voltage for incandescent lamps for general lighting and for small power purposes on their alternating-current systems. The present standard for this service is 110 volts. The petition alleges that more than 43 per cent of all the incandescent lamps within the range of 100 and 130 volts manufactured and sold in the United States in 1924 were of 115 volts, and that the change in the territories served by these companies is in the interest of standardization. It is stated that conferences have been held between the manufacturers and engineers of the various companies, the unanimous opinion being that the change, which would be gradual, would be desirable from every standpoint and in the public interest.

"World's Largest" Locomotive Tested.—What is declared to be the world's largest locomotive, an electric engine 152 ft. long, weighing 1,275,900 lb. and with a rating of 7,125 hp., underwent its first running test on the Westinghouse Electric & Manufacturing Company's test track last week. The locomotive, the first completed of thirty-six ordered by the Virginian Railway for its fifteen-million-dollar electrification project between Mullens, W. Va., and Roanoke, Va., is built in three units, each of which has two driving motors installed. A gear ratio of 21 to 100 is maintained between the driving motor and the drive wheels. The control is of the electropneumatic type. Each of the three cab units has continuous speed ratings of 14.2 miles per hour and 28.4 miles per hour depending upon the load. The engines have a maximum speed of 38 miles per hour. The locomotives have been designed for either 11,000 volts or 22,000 volts between the trolley and rail. The electrification includes 133.6 miles of route and 213 track-miles. The power plant for supplying the 11,000-volt or 22,000-volt alternating current is rapidly nearing completion. A part of the overhead catenary structure has been installed, and the remainder of the locomotives after the

British Electrical Engineer Visits Allis-Chalmers

AMONG the many engineers from Europe who have recently come to America on business trips is H. W. Clothier, technical director of A. Reyrolle & Company, Ltd., Hebburn-on-Tyne, England, who is a member of the A. I. E. E. as well as of the Institution of Electrical Engineers of Great Britain and whose visit to the United States concerns the wider use in this country of metal-clad switchgear for the control of electrical energy. Mr. Clothier is shown on the right of Otto H. Falk, president of the Allis-Chalmers Manufacturing Company, the picture having been taken while the English visitor was in Milwaukee.

first is delivered will be shipped from the Westinghouse works on a schedule of one or two monthly. It is expected that complete electric operation of this section of road will be started before the close of the present year.

Hearings Set for California Safety Orders.—A revision of the electrical safety orders of the Industrial Accident Commission of California will be submitted at public hearings, one to be held in the State Building, San Francisco, May 26, and the other in the Pacific Finance Building, Los Angeles, June 2. The orders up for consideration are the result of experience gained from a practical trial of proposed safety orders issued in 1922 and quite generally applied throughout the state. The new safety orders will supersede the "electrical utilization safety orders" issued July 1, 1917.

Two Quebec Hydro-Electric Companies Are Merged.—The Laurentian Hydro-Electric Company and La Compagnie Electrique des Laurentides, which supply power to the Laurentian districts north of Montreal, have been merged, the Quebec Southern Power Corporation, a recent incorporation backed by the same interests that control the Gatineau River Power Company, now controlling the Laurentian Hydro-Electric through ownership of over 90 per cent of the outstanding stock and having absorbed the Compagnie Electrique des Laurentides. The merger makes available to the Quebec Southern Power Corporation a potential development of 76,000 hp. Thirty-one towns are served by the new company and its subsidiary.

New York Central Electrification.—The New York Public Service Commission has issued an order approving the plans of the New York Central Railroad Company for the electrification of the Yonkers branch of its Putnam division. The order provides that the existing system of electrification on the New York Central in New York City shall be applied. This system employs the underrunning contact type of third rail, the third rail being of the protected type and having a nominal rating of 650 volts, direct current. The company purposes to proceed immediately with the electrification of the two tracks of the branch, including the sidings and cross-overs.

Wisconsin Utilities Association Adopts Research Program.—A. J. Goedjen, chairman of the Electric Section of the Wisconsin Utilities Association, has appointed seven committees, whose membership includes utility men from all parts of the state, to carry on a comprehensive one-year research program. State investigations will be conducted to ascertain how radio can be more effectively used in the detection of leaks which cause losses to companies as well as interference with radio reception. Other research work will deal with improvement in telephone and electric transmission where lines parallel each other, rural electric service, meter inspection, underground and overhead wire systems, power factor and co-operation with the University of Wisconsin. Chairmen of the committees have been appointed as follows: Radio co-ordination, L. J. Beckwith, Milwaukee; rural electric service, R. G. Walter, Madison; industrial co-ordination, M. H. Frank, Fond du Lac; meters, T. N. Langum, Madison; underground systems, R. Dodd, Milwaukee; overhead systems, A. G. Carson, Green Bay; power factor, E. S. Schrank, Oshkosh.

Puget Sound Company Promises Rate Reduction. — Simultaneously with the opening of the new 40,000-hp. hydro-electric plant at Baker River, Wash., on September 1 of this year, the Puget Sound Power & Light Company, Seattle, will reduce its residence and commercial lighting rates throughout the territory outside of Seattle, President A. W. Leonard announces. The reduction will be one-half cent a kilowatt-hour applied directly to the primary rate. The aggregate saving to company customers will amount to more than $150,000 a year, company officials announce.

Coming Meetings of Electrical and Allied Societies

[A complete directory of electrical associations, with their secretaries, is published in the first issue of each volume. For latest list see ELECTRICAL WORLD, January 3, page 76.]

Electric Power Club—Hot Springs, Va., May 25-28. S. N. Clarkson, B. F. Keith Bldg., Cleveland, Ohio.

Vermont Electrical Association—Montpelier, May 27. A. W. Peterson, St. Albans, Vt.

American Association of Engineers—Orlando, Fla., June 2-5. C. E. Drayer, 63 East Adams Street, Chicago.

Electrical Supply Jobbers' Association—Hot Springs, Va., June 3-5. Franklin Overbagh, 411 S. Clinton St., Chicago.

Iowa Section, N. E. L. A.—Hotel Russell-Lamson, Waterloo, Iowa, June 3-4. H. E. Weeks, 623 Union-Davenport Bldg., Davenport.

National Electrical Credit Association—Atlantic City, June 6-7; Philadelphia, June 8-9. F. P. Vose, Marquette Bldg., Chicago, Ill.

Associated Manufacturers of Electrical Supplies — The Homestead, Hot Springs, Va., June 8-12. F. Nicholas, 30 East 42d St., New York.

Northwest Electric Light and Power Association (Geographic Division N. E. L. A.)—Gasco Bldg., Portland, Ore., June 12. W. A. White, Puget Sound Power & Light Co., Portland.

Pacific Coast Electrical Association (Geographic Division N. E. L. A.)—San Francisco, June 15. S. H. Taylor, 529 Rialto Bldg., San Francisco.

National Electric Light Association—San Francisco, June 15-19. M. H. Aylesworth, 29 West 39th St., New York.

Society for the Promotion of Engineering Education — Union College, Schenectady, N. Y., June 17-20. F. L. Bishop, University of Pittsburgh, Pittsburgh.

National Council Lighting Fixture Manufacturers and National Association of Lighting Equipment Dealers—The Ambassador, Atlantic City, June 17-19. Herman Plaut, 432 E. 23d St., New York.

American Society for Testing Materials—Chalfonte-Haddon Hall Hotels, Atlantic City, N. J., June 22-26. C. L. Warwick, 1315 Spruce St., Philadelphia.

American Institute of Electrical Engineers—United States Hotel, Saratoga, N. Y., June 23-27. F. L. Hutchinson, 33 West 39th St., New York.

Michigan Electric Light Association—Grand Hotel, Mackinac Island, June 25-27. Herbert Silvester, 401 South Main St., Ann Arbor, Mich.

Empire State Gas and Electric Association—(Commercial Section)—Schenectady, June 25-26. C. H. B. Chapin, Grand Central Terminal, New York.

East Central Division, N. E. L. A.—Breakers Hotel, Cedar Point, Ohio, July 14-17. D. L. Gaskill, Greenville, Ohio.

North Central Division, N. E. L. A.—Duluth, Minn., July 15-17. H. E. Young, Minneapolis General Electric Co., Minneapolis.

International Municipal Electricians Set Date for Convention.—The thirtieth annual convention of the International Association of Municipal Electricians will, it is officially announced, be held in the Hotel Statler, Detroit, on August 17-20. Jacob Grimm, chief police signal system, Buffalo, is president of the organization and William Arbuckle, superintendent of fire alarm, Bayonne, N. J., is the secretary.

Toronto's New Steam Plant May Get Under Way Soon.—The construction of the Ontario Hydro-Electric Commission's proposed steam auxiliary power plant at Toronto, to include coking and steam-heating features, will be proceeded with this summer, if an opinion expressed by Mayor Foster of that city proves right. The Ontario government appropriated $10,000,000 for the project. At the time of the first appropriation of $5,000,000 the coking feature of the system was not contemplated. The sum now mentioned is $7,000,000, but the expenditure requires the sanction of a government order in council before it can be made. It is proposed to develop 100,000 hp. of electricity.

S. E. D. Institutes a New Service.—Beginning June 1, the Society for Electrical Development will issue a monthly merchandising and advertising service made up in loose-leaf form and designed to assist contractors and others retailing electrical appliances in increasing their business. Each monthly service will also be collated into a standard package, and member companies may subscribe to this complete service at a nominal cost per year. The society will also issue periodically to its members a series of printed reports on the various phases of its work. These will cover lighting, electric delivery and industrial transportation, range promotion, statistics, fire investigations, etc.

West Penn and Duquesne Companies Link Springdale and Colfax Plants.—The Duquesne Light Company and the West Penn Power Company have just completed a tie line between their Ohio River plants, located respectively at Colfax and Springdale, 15 and 18 miles from the center of Pittsburgh. This project, consisting of 3 miles of 132,000-vole tie line with the necessary auxiliary equipment, costing $500,000, will permit the transfer of 36,000 kva. and, together with six 22,000-volt tie lines now existing between the two companies, will make possible an interchange of 70,000 kva. in case of emergency. The line ties directly into the Springdale plant of the West Penn Company, while at the Colfax plant of the Duquesne Light Company the tension will be reduced to 66,000 volts. The new link completes an interconnected network with a generating capacity of approximately 650,000 kva., extending over 12,000 square miles in the western portion of Pennsylvania, the northwestern part of West Virginia and portions of Maryland and Ohio.

Men of the Industry

J. G. Menut New Manager of Jersey Utility

J. G. Menut, who has been general manager of the Rutland (Vt.) Railway, Light & Power Company, the Vermont Hydro-Electric Corporation and the Pittsford Power Company since 1919, has recently been appointed vice-president and general manager of the New Jersey Power & Light Company, Dover, succeeding Eugene L. White, resigned, effective June 1. Mr. Menut's early years in the electrical industry were spent in his native place, St. Johnsbury, Vt., with the St. Johnsbury Electric Company and with the Bethlehem (N. H.) Electric Company, the Lydonville (Vt.) electric municipal plant

J. G. MENUT

and the Lebanon (N. H.) Electric Company.

After being several months in charge of electrical construction work at Speedwell Farms, the Vermont estate of Theodore N. Vail, he established an electrical contracting business in Springfield, Vt., which he carried on for two years. From 1910 to 1915 he was manager of the electric department of the John T. Slack Corporation, Springfield, Vt., which was a local electric public utility. In 1913 this was taken over by the Colonial Power & Light Company in connection with several other properties which the W. S. Barstow Company acquired. Since that time he has been with the W. S. Barstow Company and W. S. Barstow Management Association in various positions.

For two years Mr. Menut served as president of the Vermont Electrical Association and for a number of years as a member of the executive committee. He was also director for Vermont of the "better home-lighting" contest.

General **James G. Harbord**, president of the Radio Corporation of America, sailed for Europe, May 16, aboard the French liner *Paris*. He will remain abroad for five weeks.

W. D. **Johnson**, formerly general superintendent of the Natrona Power Company, Casper, Wyo., recently acquired by the Mountain States Power Company to be operated as the Wyoming division of that organization, has been appointed as manager at Casper.

Lawrence A. Coleman, who has been for many years connected with the United Electric Light & Power Company, New York, and for eight years has been treasurer of that organization, has been elected vice-president of the New York & Queens Electric Light & Power Company. Mr. Coleman will devote his attention largely to the commercial activities of the company and to matters concerning relations with customers.

Dr. Elihu Thomson, a founder of the General Electric Company and at the present time the director of the company's research laboratory at Lynn, Mass., was awarded the Franklin medal and certificate of honorary membership in the Franklin Institute before a distinguished gathering of scientists in the Institute auditorium at Philadelphia on May 20. Following the presentation of the medal Dr. Thomson read a paper covering the results of his experiments over a twenty-year period with fused silica or quartz glass.

Arnold Roth, consulting engineer of Lyons, France, is at present in this country on a two-month visit of inspection of American electrical systems. Mr. Roth is a member of the foreign practice committee of the National Electric Light Association.

W. H. Lawson, formerly assistant manager of the Rutland (Vt.) Railway, Light & Power Company, has been promoted to the position of general manager to succeed J. G. Menut, who has recently been appointed vice-president and general manager of the New Jersey Power & Light Company, Dover.

C. T. Sinclair, formerly superintendent of the transmission and distribution department of the United Electric Light & Power Company, New York, has affiliated himself in a similar capacity with the Philadelphia division of the Duquesne Light Company of Pittsburgh. Mr. Sinclair entered the service of the United in 1922 after an association with the Pennsylvania Water & Power Supply Company of Philadelphia. In his new capacity he will assume the title of engineer of transmission and distribution.

Ambrose Swasey, founder of the Engineering Foundation, was the guest of honor at a dinner given May 14 at the Union League Club, New York, by the present and former members of the Foundation, the trustees of the United Engineering Society and the officers and directors of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Society of Civil Engineers and the American Institute of Mining and Metallurgical Engineers. Dr. Frank B. Jewett, a former vice-chairman of the foundation, made an address on "Permalloy Cables for Submarine Telegraph."

Major Edgerton Succeeds Colonel Kelly on Commission

Major Glenn E. Edgerton, for the past nine months assistant chief engineer for the Federal Power Commission, is to succeed Colonel William Kelly as chief engineer of the commission. Major Edgerton's most important engineering work was in connection with

G. E. EDGERTON

the development of the highway system in Alaska, he having served as chief engineer for the Alaska Road Commission for five years. During the war he was in charge of the training of eight engineering regiments, later becoming division engineer of the Fourteenth Division. After the war Major Edgerton was director of sales for two years, during which time he was in charge of the disposition of more than $150,000,000 of surplus property.

As a scholar Major Edgerton has attained unusual distinction. He stood at the head of the class of 1908 at the United States Military Academy and is an honor graduate of the General Staff School. Prior to entering West Point he had received the degrees of mechanical engineer and of civil engineer from the Agricultural College at Kansas.

Obituary

George Smart, managing news editor of the *Iron Age*, died of erysipelas, May 16, at his home in Forest Hills Gardens, Queens, New York, after a week's illness. He was formerly chairman of the Editorial Conference of the New York Business Publishers' Association, Inc., and was a member of the executive committee of the National Conference of Business Paper Editors.

Dr. Charles W. Burrows, one of the leading authorities in this country on the magnetic analysis of steel, died May 2. A graduate of the University of Michigan and later a member of its teaching staff, Dr. Burrows joined the technical staff of the Bureau of Standards, Washington, in 1906, continuing in charge of the magnetic section until 1918. Since that date he had maintained a consulting engineering practice. He was a member of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Society for Steel Treating and the Engineers' Club of New York.

Commission Rulings

Summer Water-Heating Service Not Insisted on Where Manifestly It Would Bring No Profit.—Granting permission to the Northern Indiana Power Company to discontinue summer steam service used for water heating at Rochester, Ind., the Public Service Commission of that state said that to order its continuance would be confiscation, since the company now supplied the town with electric service over its high-tension wires and not from a local plant and hence did not need its boilers in generating energy. The commission also gave as a reason for permitting the discontinuance of the service the fact of its unique character, no other company of which the commission had knowledge having ever supplied steam service in the summer months.

Working Capital Not to Be Based Upon Percentage of Gross Revenue.—The Illinois Commerce Commission has disapproved of a method adopted by the Rockford Electric Company according to which the cash working capital of the utility was based upon a percentage of gross revenue. The commission declared that it could see no reason for basing such an estimate upon revenue, since the inclusion of working capital is necessary to provide funds to meet the operating expenses of the utility until such time as the revenue from operations is received and bears no relation to that revenue. The commission said, however, that it bears a distinct relationship to the amount of the company's operating expenses and also to the price level of operating supplies.

Alabama Commission Approves of Off-Peak Power Rates.—The practice of electric utility companies in selling off-peak power to certain consumers at a reduced rate was upheld by the Alabama Public Service Commission in dismissing a complaint made against the Birmingham Electric Company by the Terminal Ice Company. The commission said: "In the opinion of the commission, the characterization of such off-peak power as a sort of by-product of the utility's operations is appropriate. It is clear, we think, that a utility should be allowed to sell such so-called by-product since the addition of the proceeds to the utility's income enables it to that extent to provide primary power at a lower rate. It appears to the commission that it would be unreasonable to deprive the utility of this source of income, and to do so would increase the burden upon consumers of primary power. To permit the utility to sell off-peak power at a lower rate than that prescribed for primary power is also justified for the reason, among other things, that the customer must take such off-peak power under the limitations applicable thereto, which does not apply to primary power. Off-peak rates of this character have frequently been approved in the past by this and other commissions for electric utilities, and the commission believes they are based on sound economics and are to the best interest of the rate-paying public as well as the utility." The commission also decreed that the company should supply customers with this class of service according to the order of priority in which their applications were received.

Purchase of Stock Cannot Be Made Condition of Receiving Service.—In the case of Rolio vs. Miller Ditch Company the Utah Public Utility Commission enunciated its view in regard to compulsory stock purchases from public utilities as a condition of furnishing service as follows: "A public utility company may not arbitrarily give or refuse to give service in accordance with some preconceived idea of financing. Under the law it may not discriminate as between customers or classes of customers, either as regards service or rates. While we realize that in many instances the holding of stock of a public utility company by consumers is desirable, such purchase must be voluntary."

Commission Analyzes Proposals of Rival Companies and Favors the One More Profitable to Users.—The New York Public Service Commission, in granting the petition of the Adirondack Power & Light Corporation for permission to serve the town of Hartford and denying the petition of the Granville Electric & Gas Company for consent to serve the same territory, in a case where both companies had obtained franchises from the town board and each opposed approval of the exercise of the franchise by the other, analyzed their comparative proposals, which were as follows: The Granville company proposed to extend its lines from a point near Middle Granville southwesterly through the town of Granville and town of Hartford to the villages of Hartford and South Hartford, a distance of about 10 miles. The cost of the line was estimated at from $20,000 to $25,000, making an investment cost of about $250 per customer. The Adirondack company proposed to construct a single-phase line from Adamsville in the town of Kingsbury to Hartford and South Hartford, at a cost of about $13,500, or an investment cost of about $135 per customer. If the line were to be converted to the three-phase system proposed by the Granville company, the investment cost would be about $161.70 per customer. The Adirondack company proposed a rate of 9 cents per kilowatt-hour with a minimum charge of $3 per month. The Granville company proposed a minimum rate of $2 per month with a charge of 18 cents per kilowatt-hour. From the evidence submitted the commission concluded that the rates proposed by the Adirondack company would be more favorable to the prospective users. It was also held that the difference in investment costs might at some future time have an important bearing on rates to be charged. If a return of 8 per cent were to be paid on the additional cost of the Granville lines, it would require $7 more from each consumer than the Adirondack's service, the commission's memorandum pointed out.

Recent Court Decisions

Judgments of State Supreme Courts in Rate Cases Are Reviewable on Writ of Error by the United States Supreme Court.—In the case of the Northern Pacific Railway Company vs. Department of Public Works of Washington the United States Supreme Court has rendered a decision which applies to all public utilities. The Department of Public Works had reduced intrastate freight rates on logs and the Northern Pacific in conjunction with other interested roads had carried the case to the State Supreme Court. This court upheld the lowering of rates, and the railroad appealed to the United States Supreme Court on a writ of error, though the Department of Public Works maintained that the case was not reviewable by the United States Supreme Court on such a writ. The United States Supreme Court, holding that the case as presented was within its jurisdiction, overruled the decision of the Washington court and reversed its decisions upholding the rate reduction on the ground that the findings were not based on the evidence produced and that the rates allowed were confiscatory. The issue of confiscation was not avoided, the Supreme Court said, by making the order for an experimental period. (45 S. C. R. 412.)*

State Not Liable for Depriving Hydro-Electric Company of Water in Building Navigable Canal.—Former Court of Appeals Judge Frederick Collin, sitting as an official referee, has laid down principles of law which are considered to be of great importance to New York State in connection with the maintenance and operation of the Barge Canal. The Tracy Development Company, which owns a hydro-electric plant on the so-called Waterloo dam in the Seneca River, sought to recover more than $1,000,000 damages because of interference with the natural flow of the waters of the river in the course of building and operating state canals. Judge Collin holds that the state could, without becoming liable for damages, effect such lake storage and regulation of the flow of the Seneca River for the purpose of rendering it navigable for vessels plying the canal as would prevent the power company from drawing water from the Waterloo dam at a time or in quantities to bring about less than the 12-ft. depth of water originally planned for the Barge Canal. He limits claimant's recovery to the sum of $52,000, covering other items of its claim. This litigation, the result of which it is believed will have an important bearing upon the disposition to be made of other claims against the state involving several million dollars, has been one of the longest and most expensive which the state has been called upon to meet, evidence having been taken from time to time before official referees and many engineers of high standing testifying on each side.

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Manufacturing and Markets

Conference Board Enlarges Membership

Participation of Prominent Executives Promises Wider Usefulness of Board to Industry

SIGNIFICANT enlargement in membership of the National Industrial Conference Board, 247 Park Avenue, New York, was announced this week, following the election of thirteen members-at-large representing a number of the largest industrial organizations in the United States. The new members-at-large, elected for two years, are A. C. Bedford, chairman Standard Oil Company of New Jersey; Charles F. Brooker, chairman American Brass Company; W. L. Clause, chairman Pittsburgh Plate Glass Company; Philip T. Dodge, chairman International Paper Company; Irenée du Pont, president E. I. du Pont de Nemours & Company; Eugene G. Grace, president Bethlehem Steel Corporation; Alanson B. Houghton, Ambassador to Great Britain, chairman Corning Glass Works; L. F. Loree, president Delaware & Hudson Company; William H. Nichols, chairman Allied Chemical & Dye Corporation; Guy E. Tripp, chairman Westinghouse Electric & Manufacturing Company; H. Herman Westinghouse, chairman Westinghouse Air Brake Company; Owen D. Young, chairman General Electric Company, and George M. Verity, president American Rolling Mills Company.

"The participation of these prominent executives in the work and deliberations of the conference board," said Mr. Alexander, president of the board, "promises a correspondingly wider usefulness of the functions and service of the board to industry and the public at large." The executive committee of the conference board for the ensuing year will be: Charles Cheney, chairman Cheney Brothers; William H. Nichols, Jr., president General Chemical Company; John A. Penton, chairman Penton Publishing Company, and Fayette R. Plumb, president Fayette R. Plumb, Inc. The officers of the board re-elected for the year are: Chairman, Frederick P. Fish; vice-chairman, Loyall A. Osborne; vice-chairman, John W. O'Leary; treasurer, Fred I. Kent; president, Magnus W. Alexander.

Advertising and Marketing

WHAT part advertising properly plays in the economy of distribution or marketing is to be the subject of study by publishers, advertising men, merchants and manufacturers composing one of the committees designated by the national distribution conference organized under the auspices of the Chamber of Commerce of the United States.

How the problem is to be dealt with was indicated at the first meeting of the committee held in New York. Two general aspects of the question were outlined—one the determination of market conditions, the other the use of advertising in meeting market requirements.

Three composite sub-committees have been created to make the necessary studies. The first of these, under the chairmanship of P. L. Thomson of the General Electric Company, will determine the statistics needed in market analysis. The second, under the chairmanship of Dr. Daniel Starch of the American Association of Advertising Agencies, will study the compilation of market information by the Department of Commerce and recommend the inclusion of elements essential in the work of market analysis. It will fall to the lot of the third sub-committee, headed by L. B. Jones of the Eastman Kodak Company, to define the economic value of advertising, to classify advertising mediums according to their special functions in the economy of distribution and recommend methods for eliminating wastes in advertising.

Motor Price Reductions Discussed

Manufacturers Consider that Market Conditions Did Not Justify Price Decrease—Action Believed Precipitated by Price-Cutting Policy of Some Companies

RECENT reductions in the price of motors have aroused considerable discussion in the industry. The lower prices on single-phase repulsion induction motors announced by the Century Electric Company were immediately followed and met by all of the other companies producing that class of machinery. A few days later the General Electric Company announced a price reduction on its standard types of polyphase induction motors. In making this announcement J. G. Barry, vice-president, said:

"These motors are used to the extent of millions of dollars per year in factories and workshops. Improvements in design, in standardization and in processes of manufacture have produced lower costs, making this reduction in price possible."

In order to crystallize the varied discussion which the later price change elicited the ELECTRICAL WORLD requested the various motor manufacturers to express their views, and from the opinions received the following quotations are made.

One manufacturer says: "It is our feeling that this reduction was not justified by any corresponding reduction in material or labor, but was the result of the old law of supply and demand working. The producing capacity of the country on electric motors is unquestionably much larger than the country would normally absorb. Consequently, in order to keep up the production in these plants, there has been a certain amount of price cutting, and lowered prices are inevitably the result of this price cutting."

Another maker expresses this view: "Your inquiry might also well have referred to the price reduction on single-phase repulsion induction motors by the Century Electric Company. I think it is the pretty general opinion of the smaller motor manufacturers that both of these reductions are unjustified by the conditions of the industry. The electric motor industry has a very considerable surplus manufacturing capacity, and some companies seem to be striving by price reductions to acquire a larger share of the business with a view to more nearly filling their factory facilities. It is very doubtful in my mind whether price reductions on motors stimulate any new business worth mentioning. The present highly competitive conditions in the motor industry, it seems to me, are simply putting prices down to a level where there is a very unsatisfactory spread for the manufacturer, and without creating any new business. The action of the General Electric Company was no doubt considerably influenced by the competitive situation created by some of the smaller manufacturers of motors, who seem to feel that they can make any sort of price anywhere. I cannot help but feel that the trend of prices in the motor industry at the present time is likely to prove most unfortunate for many companies, and in the end probably for the industry as a whole. It is to be regretted that in an industry requiring so much education, experience and skill, which takes years to acquire, that unwise competition should drive prices to a point where motor manufacturers might with more profit engage in the manufacture of articles that do not require the highly skilled technical training that is required in this industry."

The opinion of the situation held by another company is put thus: "There was nothing in the market conditions either with respect to the virility of demand or tendency of cost to warrant a price change at that time. On the contrary, the general financial position of many of the operating companies makes better prices vital to their welfare. It is possible that on the sizes and types of motors affected by the General Electric cut that company is making a profit. I do not believe its profit at the old prices was unfairly or abnormally large. I cannot imagine that any requirement of sound business policy imperatively demanded or reasonably called for any such reduc-

tion of prices. There has been more or less price cutting in competition for business in the alternating-current motor industry. The smaller companies, in the main, have led in this competition. They no doubt have been inspired to do so in a spirit of self-preservation, at a time when there has prevailed an excess capacity. The question arises as to whether the price reduction is an economically sound policy from the standpoint of public welfare."

"In our industry, as in many others," says still another manufacturer, "a great many of the smaller manufacturers, who must be frightfully ignorant of the true cost of a good motor, have entered into a price-cutting campaign which, for the benefit of the motor manufacturers as well as buyers, is anything but healthy and sound. I am rather inclined to believe that the unfair small-company competition forced the General Electric Company to rehabilitate its industrial-size motor plants and designs to such an extent that it may be possible for that company to make a neat profit on its standard motors, but such profit as it does make I can hardly believe is sufficient to tide over the lean years, making possible an average profit which will be consistent with the cost of good motor building. It is certainly a crime that our industry, which requires such tremendous financial investment as well as such a scientific and expensive organization back of the financial investment, should be in what might be termed an almost deplorable condition."

Other opinions are:

A. "The price reductions on motors were not warranted by existing conditions. As a matter of fact, prior to this reduction the prevailing prices on motors were low and the margin of profit not sufficiently large to warrant a substantial reduction. Manufacturers of electrical apparatus should be entitled to a reasonable margin of profit, especially in view of responsibilities assumed in connection with guarantees of operation."

B. "There are two reasons for the reduction in prices made by the General Electric Company, in my opinion—in the first place, there is no doubt that its manufacturing costs warrant the reduction; in the second place, the action was precipitated by the activities of the smaller manufacturers."

C. "Modern manufacturing and aggressive sales methods over wide territories has justified price reductions of polyphase motors and I believe will tend to promote more general use of motors."

D. "The occasion for recent price reductions is rather puzzling in view of maintained or increasing costs of metals and labor. It possibly indicates redesign of machines for lower production costs."

E. "Many small motor manufacturers will find it difficult to make a profit on the sale of motors at the present prices. I believe the General Electric Company can afford to sell its motors at the reduced prices and make a profit. Manufacturers who have not redesigned their motors will find it necessary to do so, but under existing conditions it may be impossible for them to spend the money necessary to make new designs."

F. "Though costs have probably been reduced, we do not feel that there is an appreciable difference as the material market has been steady and no downward revision has occurred in labor. Further, in the small sizes of motors the item of labor is of greater percentage than in large motors. The condition of the motor industry was previously rather unsatisfactory, but the price action taken has seriously disturbed the market."

Trade Commissioners Dissent on Changes in Policy

THE Federal Trade Commission recently announced changes in its rules of procedure and policies, notice of which appeared in the April 4 issue of the ELECTRICAL WORLD. One of these rules dealt with the question of publicity in the case of complaints that have been adjusted without a trial. A dissenting memorandum on these changes in policy has been issued by Commissioner J. F. Nugent and concurred in by Huston Thompson.

The commission was primarily intended as an agency for administering justice in industrial and commercial disputes, but it has been slow in acting and its findings have often been set aside by the courts. The chief difficulty under which the commission has had to labor has been its dual functions, which are those both of prosecutor and of judge. With the present dissension in its ranks it is believed that Congress at its next session will take steps to remedy the situation, and undoubtedly there will be more talk of abolishing the commission.

Sales Possibilities in Latin-American Countries

THE fact that it costs no more to send a salesman through the nearby Latin-American countries than it does to send him on a trip of equal duration to the Pacific Coast States is not recognized generally by the manufacturers of electrical equipment, a recent official study reveals. Sales in these countries should be handled more as is done in the domestic market, rather than by following the practices applied to more distant foreign markets. While the United States is getting a considerable part of the electrical business of these countries, it could get more, and an unusual opportunity exists to encourage further use of electrical devices. Were the cities in the warmer regions of Latin America as well equipped with fans as are our Southern cities, that item alone would produce orders in an imposing aggregate. Aggressive sales methods will produce this demand.

There still are many communities unsupplied with electricity. This field alone is held to be a very promising one, particularly since the extension of service brings an immediate demand for appliances. The people of Latin America are able to absorb appliances to an extent somewhat out of proportion to the per capita buying power. Electric ranges, for instance, are used to a surprising extent in some sections. Charcoal has been the kitchen fuel in Latin America since the days of the Spaniards, but suitable wood for this purpose is becoming scarce and prices are mounting to the point where electric heat is becoming a more formidable competitor.

Business Conditions

MANY sales of electrical equipment and supplies in small volume were reported by the industry this week, but these were dwarfed by the reception of one order involving approximately $1,000,000 for a 100,000-kva. steam turbo-generator—the largest unit ever purchased—and another large order for switching equipment, transformers, etc., placed by another central-station company for equipping a number of new substations. Many orders placed for supplies are for broken-package quantities, which is unsatisfactory to manufacturers. In many sections of the country there has been a very good demand for building construction material such as conduit, armored cable, etc., and industrial purchasing has been good.

A report of the National Industrial Conference Board just issued asserts that the first phase of the revival of industrial activity which began in August, 1924, came to an end last February, but left industry and business as a whole in a much improved condition as result of the seven months' steady, gradual progress. While March figures covering business activity indicate that the upward movement has come to at least a temporary halt, a survey of the Conference Board covering twenty-five industries shows up to that time a 14.3 per cent increase in employment, with manufacturers handling a greater volume of business and the workers earning more money per week than they were last August. A general improvement has been noted in the iron and steel industry.

In New England central-station supplies and equipment for repairs and extensions are in good demand. Sales of poles, wire, cross-arms and fiber conduit have been active in that territory. Industrial buying is good in the New York district. The single order for about $1,000,000 just referred to was placed by a central-station company in that district, and other orders are in good volume though individually small—many items calling for broken-package quantities. In the Southeast heavy construction by central-station companies, as well as building construction, has been responsible for sustaining the volume of sales. The volume of transactions has decreased somewhat in the Middle West, but business is considered good. On the Pacific Coast the sale of motors for pumping plants is good, especially in the 3-hp. and 5-hp. sizes. Several industrial plants under construction in that section will soon require a number of motors.

Demand for Synchronous Motors on the Increase

AS COMPARED with motors of other types there is an increasing demand for synchronous motors, including the smaller sizes. The demand for drives for ammonia compressors is apparently increasing more rapidly than that for air compressors owing to the activities in the ice and refrigeration field. One manufacturer reports that a new synchronous motor placed on the market has resulted in an extension of application to industrial lines. Some applications, such as driving tube mills in the cement industry and Hardinge mills in the metal mining industry, have proved very satisfactory. Additional uses have also been found for synchronous motors in paper mills.

Another manufacturer who has placed a new type of small synchronous motor on the market reports a gratifying increase in demand for this equipment, especially in the Middle West and Southwest. Deliveries on the average are good, as the essential parts for the most used ratings are carried in stock. The demands, however, have been somewhat erratic, being far above the average some weeks, which tends to lengthen deliveries. In addition, purchasers have refrained from placing orders until the last moment, when the requirement was imperative, thus placing unusual burdens on the manufacturers. Deliveries vary from six to ten weeks, with this time much increased for the lower speeds, such as 72 r.p.m. The present demand is chiefly for sizes from 150 hp. to 225 hp. at speeds from 120 r.p.m. to 225 r.p.m. The price trend is stable. Price revisions have not been made for about a year. One manufacturer contemplates the probability of increasing the available line of ratings, especially of the belted type.

Demand for Metals Moderate—Lead Active and Price Increases

COPPER, zinc and tin have been in only moderate demand, though a few small sales were recorded every day. Lead, on the other hand, has sold in good volume and at advancing prices. Only moderate tonnages of copper were sold in the domestic market.

All producers have been trying to sell with spot metal practically unobtainable. Only moderate tonnages of copper were sold in the domestic market. All producers have been trying to sell at 13⅝ cents delivered, and all consumers have been endeavoring to buy at 13½ cents. The producers have had the best of it, for by far the largest amount of the copper that has been sold has been booked at 13⅝ cents. Producers are for the most part well sold up, and there is no indication of any particular pressure on the market in the immediate future. Export business has been relatively better than domestic.

Two advances were made in the contract price of the American Smelting & Refining Company. Lead is not very plentiful. One producer has begun to ration his supplies of June metal but is more liberal with July shipments. The zinc market has not been active, though all sellers report a little business, chiefly from galvanizers for May and June delivery. The price has declined slightly. Tin prices have moved about very little during the week, with only a small tonnage going into the hands of actual consumers.

NEW YORK METAL MARKET PRICES

	May 13, 1925 Cents per Pound	May 20, 1925 Cents per Pound
Copper, electrolytic	13.57½–13.62½	13.6
Lead, Am. S. & R. price	7⅛	8
Antimony	17½	17
Nickel, ingot	31	31
Zinc, spot	7.30–7.35	7.25
Tin, Straits	54½	54
Aluminum, 98 to 99 per cent.	28	28

Base copper price May 20, 1925, 16 cents.

French Electrical Syndicate Adopts Common Trademark

THE French Union des Syndicats de l'Electricité in order to assure the buying and consuming public of the quality of electrical goods and appliances has adopted a common trademark which members are henceforth to apply to their various products. Its object is to distinguish what are virtually guaranteed materials from those put out by manufacturers who may not have adhered to the prescriptions of the union. The mark consists of the initials "U.S.E." and may be applied only by French manufacturers on products actually manufactured in France. Furthermore, all such must correspond in detail to the various specifications put out by the union.

In a general way this trademark, or national marque de fabrique, supplements that of "Unis-France," which also may be used by manufacturers of electrical material who have the right to do so. The jury of the union which will grant the privilege of carrying the "U.S.E." mark is avowedly impartial and will grant the privilege to any manufacturer who qualifies by meeting the conditions set forth, whether he be a member of the union or not.

Industrial Purchasing Good in the New York District

AN ORDER for about $1,000,000, covering a 100,000-kva. turbo-generator, has been placed by the Brooklyn Edison Company with the Westinghouse Electric & Manufacturing Company. This unit will have the distinction of being the world's largest turbine. Other orders placed by central-station companies in the New York district are in small quantity. A few inquiries are being received for cross-arms with orders covering two or three hundred at a time and occasionally a carload. Pole-line hardware is being purchased in the same manner. Manufacturers of that commodity report that many orders call for broken-package quantities. However, good business for that material was placed by some of the larger companies. Two orders were received for approximately $14,000 worth of material each, and another order was for about $10,000 worth of material.

Industrial plants are buying material in good volume. An order for $35,000 worth of magnet wire was placed by an elevator manufacturer. Another manufacturer reports that industrial sales are good, and in another case the business transacted so far in May is above that of April. Jobbers note a steady change for the better. There is a very good demand for construction material, armored cable, conduit, etc., with competition for business very keen. Fan sales are reported as being very good, and there are indications of a good season for that commodity.

Business Good in Middle West—Volume Decreased Somewhat

THE volume of business has fallen off somewhat in the Middle West, but conditions are substantially satisfactory and business is considered good. Some excellent orders for equipment were placed by the various utility companies this week, such as an eighty-five-thousand-dollar order for plate-type air heaters, twenty-two hydraulically operated circuit breakers and six 1,000-amp. single-pole, single-throw disconnecting switches. There was a good demand for meters and current transformers, one central-station company purchasing 10,000 watt-hour meters, 1,900 Thompson meters and 500 current transformers. Jobbers report a quiet week, with business satisfactory in most respects, but there was a slight decrease in the volume of sales in certain lines. Appliance sales have shown a slight increase.

Central-Station Supplies Active in New England District

CENTRAL-STATION supplies and equipment for repairs and extensions are in good demand in New England. During the past week one manufacturer received an order from the Connecticut Power Company for two 5,000-kva. transformers, amounting to about $70,000, and, in addition, another order from the Worcester Electric Lighting Company for switch and control apparatus amounting to about $60,000. A good volume of sales is also reported by jobbers. One jobber reports the sale of seven cars of poles, six cars of cross-arms and a strong movement in weatherproof wire and pole-line hardware. Another records the sale of eight cars of general supplies with poles, wire, cross-arms, and fiber conduit most active.

Motors sales are dull and confined to single orders. One manufacturer of small motors reports his present production at about 75 per cent of capacity output. Contractors' power units and motors for woodworking machinery still attract considerable interest. Industrial lighting and house wiring is active. Many inquiries for fixtures and general wiring supplies are reported. Domestic electrical appliances continue to sell well. Refrigerating units, in particular, are prominent.

Heavy Construction Maintaining Volume of Sales in Southeast

PURCHASES of line and construction materials by central-station companies are steady and in good volume in the Southeast. Poles and pole-line hardware are in very active demand, but most of the pole orders are being placed directly with the supply firms.

Jobbers report their business satisfactory, with heavy construction responsible for the volume being sustained. Building construction contracts awarded in nine Southeastern states in April amounted to $50,813,400, which is about 6 per cent under the total for the same month last year. Distribution transformers are in active demand, with the best business coming from Florida. Electric retail business generally is quiet, especially in the Atlanta territory.

Sales of farm-lighting outfits are slow at present, but crop conditions point to increased demand in the early fall. Electric water-pumping equipment is moving satisfactorily, the orders coming mostly from those sections adjacent to the larger towns. Domestic electric refrigerating machines are in active demand, the Southeastern district representative of one of the large manufacturers stating that orders are sixty days behind in delivery. One order was placed during the past two weeks for forty-four "Frigidaires" for one apartment-house installation in Macon, Ga. The efforts of central-station companies are doing much to push the sales of this specialty. Electric ice-cream cabinets are also in brisk demand. The Birmingham Electric Company recently purchased an electric truck and is the third large central-station company in this section to buy electric trucks.

Sales of Motors for Pumping Plants Good on Pacific Coast

SALES of motors on the Pacific Coast have been good, especially in the 3-hp. and 5-hp. sizes for pumping plants. Local stocks in the latter size are low. One recent order covered twelve motors. Several industrial plants under construction will soon require a number of motors. A box factory and a coffee house that are approaching completion will require about twenty-five motors each ranging from 5 hp. to 20 hp. Power-company purchasing has been light this month. It includes four carloads of 55-ft. to 65-ft. poles, 25,000 pins and 15,000 plug fuses. The Pacific Gas & Electric Company is completing a new warehouse in Oakland and is regulating its immediate purchases accordingly.

Unprecedented May rains have caused considerable damage to crops in the coast valleys. Dealers in that section say that business immediately slumped. Much construction work in the Bay region of San Francisco has been held up. Southern California was comparatively unaffected and its business is very good. A number of hospitals are being built in that section, presaging a demand for lighting units, hospital signal systems, supplies, wiring, etc. Domestic appliances, fans, etc., are in good demand. If May building contracts approach April in volume, a heavy constructional program for the remainder of the summer is assured. Mill owners have postponed indefinitely the buying of electrical machinery and equipment and are still operating on reduced schedule. Prices are fairly steady, though lead cables have just decreased 5 per cent, and competition is very keen.

Activities of the Trade

Condit Company Developing Larger Manufacturing Facilities

The Condit Electrical Manufacturing Company, Boston, has purchased a 15-acre tract containing two high-grade brick buildings covering about 200,000 sq.ft. of floor space at Hyde Park, Mass. This property is served with a spur track from the main line of the New York, New Haven & Hartford Railroad. The company is now completing a new brick building on the property 40 ft. high and having an area of about 22,000 sq.ft. During the summer various manufacturing activities will be housed in these buildings in addition to the facilities now utilized at the company's plant at 838 Summer Street, South Boston, where the main offices of the company will remain.

Triumph Electric Company Declared Solvent

A long-drawn-out litigation involving the Triumph Electric Company, Cincinnati, has been ended as the result of a verdict rendered in the United States District Court at Dayton, Ohio, by Judge Hickenlooper, declaring that the company is not bankrupt and dismissing the petitions of three creditors.

In answering the claims of the creditors the Triumph company produced figures to show that its assets exceeded its liabilities by $500,000. The suit was brought by the McIlvain & Spiegel Boiler & Tank Company, the National Lead Company and the Stacey Brothers Gas Construction Company.

Westinghouse Establishes Two New Branch Offices

Branch offices at Tampa, Fla., and at Chattanooga, Tenn., have been established by the Westinghouse Electric & Manufacturing Company. W. L. Southwell, formerly merchandising manager at Atlanta, will be branch manager of the new branch office at Tampa. W. W. Ballew, formerly manager of the central-station division, will hereafter be branch manager at Atlanta. J. C. Boesch is appointed branch manager of the Chattanooga office and J. G. Simpson manager of the central-station division at Atlanta. R. H. Atkinson has been appointed manager of the merchandising division of the Atlanta office.

Thirteenth Illumination Course to Be Held at Nela Park

The thirteenth Illumination course of the National Lamp Works of the General Electric Company will be held at Nela Park on June 8-13. Lighting fundamentals, practical illumination design and commercial aspects will be covered by recognized authorities from the engineering and other departments at Nela Park.

For reasons of efficiency the course is limited to seventy-five persons. Names of those expecting to attend the course must be in the hands of K. A. Staehle, manager of the thirteenth illumination course, engineering department, Nela Park, not later than the morning of June 1.

L. H. Junod Now Carrying a Stock of Meters in New York

A stock of single-phase watt-hour meters and of three-phase, three-wire polyphase meters is now being carried in New York by L. H. Junod & Company, 104 Fifth Avenue, New York, agents for Landis & Gyr, Zug, Switzerland. There is also in stock in New York the latter type of meters with the maximum-demand indicator for ten, fifteen and thirty-minute demand intervals. The company further announces that all its meters are available with the American four-dial pointer register.

Westinghouse Receives Orders for Equipment

The Sandstone Rapids (Wis.) hydroelectric development of the Northeastern Power Company will be equipped with automatic switching apparatus manufactured by the Westinghouse Electric & Manufacturing Company. This installation will consist of two 2,400-kva., 6,900-volt, three-phase, 150-r.p.m. vertical waterwheel generators with 125-volt direct-connected flat-compound-wound exciters operating under a head of approximately 42 ft.

The generators will be connected to the system by means of automatic synchronizers. This will be the third automatic hydro station on the Northeastern Power Company's system, all being controlled by means of the audible-type supervisory control which operates over the two-wire telephone line connecting the dispatcher with each generating station.

The company has also been awarded a large contract by the Ohio Public Service Company for electrical equipment which includes switching equipment, a frequency-changer set, transformers, lightning arresters and oil circuit breakers to be installed in a number of the company's substations.

Packard Transformer Receives Order from City of Seattle

The Packard Transformer Company, Warren, Ohio, has received a contract for approximately $40,000 from the city of Seattle, Wash., for fifteen 1,000-kva. transformers. These transformers are to be used in connection with new substations to be erected by Seattle and are rated at 26,000-25,000 volts primary and 2,500-7,500 volts secondary for T-connection.

The Roller Smith Company, 233 Broadway, New York, manufacturer of electrical measuring instruments and circuit breakers, announces the appointment of the Detweiler-Bell Com-

pany, 101 Milk Street, Boston, and 152 Temple Street, New Haven, Conn., as its representative in Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island. The Detweiler-Bell Company succeeds Walter W. Gaskill, who has been representing the company in the New England territory for several years.

The Steel City Electric Company, 1207 Columbus Avenue, Pittsburgh, manufacturer of electrical specialties, announces that J. R. Richards, formerly in charge of its credit department, has been appointed sales manager to succeed V. G. Fullman, who resigned from the company on May 1 to enter another line of business.

The Robbins & Myers Company, Springfield, Ohio, manufacturer of electric motors, generators and fans, announces that it has placed on the market a new line of multi-speed motors, three-phase, 60-cycle, 220, 440 and 550 volts, ranging in size from 1 hp. to 15 hp. both in the constant-horsepower and constant-torque type. The correct type designations of the company's new line of repulsion induction motors, announced in the May 2 issue of the ELECTRICAL WORLD, are RF and RA and not IF and IA as was listed.

The Acme Wire Company, New Haven, Conn., announces the removal of its Chicago sales offices from 53 West Jackson Boulevard to 427 West Erie Street, where a warehouse will be maintained for carrying stocks of all Acme wire products as an added service to its customers who are now being served by this district sales office.

The Standard Steel & Bearings, Inc., Plainville, Conn., announces that in addition to the regulation information new "SRB" data sheets contain shaft and housing bore limits, equivalent tables and other special information helpful in properly applying ball bearings to various types of equipment.

The Circle F Manufacturing Company, Trenton, N. J., manufacturer of electrical and porcelain specialties, announces that it has now placed on the market a new line of shallow type switches in both the tumbler and push-button type. The company has also added a line of canopy switches designed for use with shallow spun or cast canopies.

The Delta-Star Electric Company, Chicago, manufacturer of switching equipment, announces that its New York office, in charge of W. S. Nichols, has moved from room 835 to room 640, 25 Broad Street, to provide larger quarters so as to take care of its increasing business.

The Liberty Electric Sign Company, Inc., 926 Royal Street, New Orleans, has opened a branch factory at Jacksonville, Fla., with Jack H. Massety in charge. The company is now operating factories in several Southern states. A factory is to be established soon at San Antonio, Tex., and a branch store at Mexico City, Mexico.

The Sharples Specialty Company, 2300 Westmoreland Street, Philadelphia, manufacturer of the Sharples portable supercentrifuge for the purification of oils, announces the opening of a new Pacific Coast office at 688 Howard Street, San Francisco, under the name of the Sharples Specialty Company of California, with L. A. Taylor in charge.

The General Electric Company has completed plans for the construction of an addition to its local plant building at Sixty-ninth Street and Elmwood Avenue, Philadelphia.

The Chicago Insulated Wire & Manufacturing Company, North California Avenue, Sycamore, Ill., has completed plans and will soon proceed with the erection of a one-story addition, 90 ft. x 100 ft., estimated to cost about $75,000, with equipment.

The Engineering Supervision Company, Inc., consulting operating engineers, announces the removal of its offices to 250 Park Avenue at Forty-sixth Street, New York City.

The Chicago Fuse Manufacturing Company, Laflin and Fifteenth Streets, Chicago, announces that in order to facilitate contact with its customers in St. Louis and vicinity it has opened a sales office at 2131 Railway Exchange Building, St. Louis, with E. M. Miller in charge.

The Alloy Metal Wire Company, Moore, Pa., manufacturer of pure-nickel, monel-metal and electrical resistance wire, is now installing in addition to its present equipment an electric furnace, cold-rolling mills and other apparatus for the manufacture of electrical resistance ribbons and strip as well as bright luster finish nickel-chrome wire for use in radio rheostats and potentiometers.

The Nehring Electric Works, Inc., De Kalb, Ill., is considering preliminary plans for the erection of a two-story addition to its plant on Locust Street, fronting on the line of the Chicago Northwestern Railroad.

The Keystone Grinder & Manufacturing Company, Pittsburgh, has placed on the market a new portable twist drill grinder weighing only 60 lb. and equipped with a Westinghouse ¼-hp. motor.

The Michigan Stove Company, Detroit, announces that it has appointed Richard R. Hindley as head of its electric range sales department in succession to Dexter Rollins, who is no longer associated with the company.

The General Electric Company announces that it has developed a synchronous motor to replace the old induction-disk motor as the timing element for its demand-meter register for watt-hour meters known as type M-9.

The Consolidated Specialty Company, 201 East South Street, Indianapolis, is now placing on the market an induction-disk, 60-cycle, 110-volt alternating-current motor revolving display fixture for use in store windows.

The W. N. Matthews Corporation, St. Louis, manufacturer of electric specialties and mechanical painting equipment, announces the appointment of G. Carl Kemper as assistant to the general sales manager, who supervises the advertising activities of the company.

The Hurley Machine Company, Twenty-second Street and Fifty-fourth Avenue, Chicago, manufacturer of "Thor" washing machines, ironers, etc., announces the offer of $300 in cash prizes for a letter giving the best four selling points contained in an advertising circular issued by the company.

The General Electric Company will shortly begin work in remodeling a five-story factory at Seventh and Willow Streets, Philadelphia, to be used for a warehouse and distributing service.

The Curtis Lighting, Inc., Chicago, announces that its St. Louis office, formerly in the Title Guaranty Building, has been removed to 312 Buder Building, Seventh and Market Streets.

The Shelton Electric Company, manufacturer of electric hair dryers, vibrators and other appliances, announces the removal of its factory and general offices to the Chicle Building, Long Island City, N. Y.

The Acme Electric & Manufacturing Company, 1444 Hamilton Avenue, Cleveland, manufacturer of battery-charging equipment, announces that it has placed on the market a new type of battery charger for use in battery service stations and garages which is adaptable to charging automobile batteries and radio "B" batteries at the same time.

The Everstick Anchor Company, 1622 North Eighth Street, St. Louis, announces that H. R. Knelson has been made sales engineer in the territory west of the Mississippi River. Mr. Knelson was formerly connected with the construction department of the Illinois Bell Telephone Company.

The Electric Controller & Manufacturing Company, 2700 East Seventy-ninth Street, Cleveland, announces the appointment of F. R. Fishback, formerly vice-president and secretary, as president of the company to succeed H. F. Stratton, who has resigned.

Porter & Ross, 30 Church Street, New York, manufacturers' agents, announce that they are now representing the Eureka Company, Northeast, Pa., in this territory. The Eureka Company manufactures commutators, copper, brass and bronze castings and forgings, etc.

The Allen-Bradley Company, Milwaukee, manufacturer of electric control apparatus, has recently moved its Chicago office to 20 West Jackson Boulevard to provide more room for the expanding activities of the company.

The Austin Company, 16112 Euclid Avenue, Cleveland, announces the removal of its New York office to larger quarters in the Equitable Building, 120 Broadway. The New York staff has also been increased. The company reports an increasing volume of industrial construction on the Atlantic seaboard during the past few months.

Pass & Seymour, Inc., Syracuse, N. Y., manufacturers of standard electric wiring devices, are placing on the market a new and complete line of all-porcelain receptacles. The line includes three groups—receptacles for 3½-in. and 4-in. boxes, 3½-in. box receptacles and deep-recessed-back receptacles for unusual situations. In each group are the chain and cord type for ceiling lights, insulated chain type for side-wall lights and the keyless type for wall-switch control. The porcelain shade holders for these units and the porcelain rings are threaded to turn on the heavy metal lamp shell, which extends through the porcelain cover.

New Equipment Available

Maximum-Demand Indicator

A maximum-demand indicator which can be furnished with any of its meters has been placed on the market by L. H. Junod & Company, 104 Fifth Avenue, New York, agent for Landis & Gyr, Ltd., Zug, Switzerland. The indicator is furnished for all intervals in practice and in alternating-current meters is controlled by a self-contained clock movement which is electrically wound. The clock movement is the lever-escapement type, fully jeweled, and is regulated to keep time to within plus or minus 0.15 per cent. The demand scale furnished with these instruments is very large. A contactor can be furnished with the indicator if it should be desired, as can also a four-dial pointer register.

Direct and Alternating Current Motors

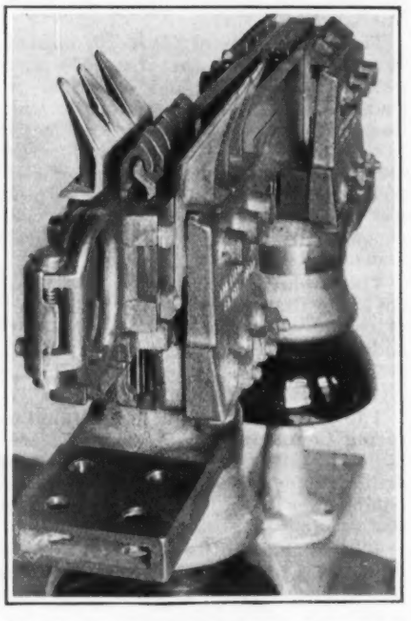
With the marketing of a new type of direct-current motor and a redesigned type of alternating-current motor, the General Electric Company is now manufacturing a completely revised line of "general-purpose" motors. This line includes all standard speeds and horsepower ratings for use on any standard circuit. The use of the steel shell, babbitted bearing, first adopted on the type KT-300 motors, has been extended to cover all general-purpose motors. The company has also made provision to furnish many of its standard types of general purpose motors with ball bearings for use by those who prefer this type. Some of the smaller direct-current and alternating-current motors of the redesigned line, rating for rating, are mechanically interchangeable. These new motors supersede the KT.300 line and are designated as the KT-500. They are also made in the wound-rotor type, which are known as the MT-500.

Improved bearing construction is said to be the keynote of the redesign of the alternating-current types. Details include larger shafts and bearings, larger oil rings with lower oil level and larger oil reservoir capacity. The oil ring is retained in its slot by a guard permanently attached under the bearing screw. Other improvements include the use of spring oil-well covers and improved insulation in the small, closed slot frames. The new direct-current motors include both constant and adjustable speed machines. The bi-polar type bears the designation BD and the four-pole motors are designated as type CD. The type BD is made in sizes from ½ hp. to 3 hp., 1,750 r.p.m., and the type CD in sizes from 3 hp. to 200 hp. at speeds of 1,750, 1,150 and 850 r.p.m., these corresponding with full-load speeds for the company's 60-cycle induction motors. These new motors comprise the complete direct-current line.

The standardization of these general-purpose motors has simplified the renewal parts problem with specific reference to bearing linings. Bearings for either alternating or direct current motors can thus be supplied from the same stock. Most of the bearing linings, also, are interchangeable in any given type of motor, a total of approximately 2,500 ratings listed utilizing not more than twenty-three different bearings.

Full-Floating, Self-Aligning Disconnecting Switch

A 3,000-amp. full-floating, self-aligning disconnecting switch has just been placed on the market by the Pacific Electric Manufacturing Company, 5815 Third Street, San Francisco. The illustration shows the self-aligning shoes, which insure positive contact, thus preventing heating. The contact shoes, the hinge shoes and the tongues projecting between the blades are all free members connected with a flexible conductor and held against the blade plates by flat steel galvanized springs. The switch is provided with a flap door latch, which is pushed aside when the switch hook is engaged in the ring handle.



SELF-ALIGNING DISCONNECTING SWITCH OF 3,000 AMP. CAPACITY

Double-Current Welding Generator

A generator that provides direct current or alternating current for use in welding has been developed by the Electric Arc Cutting & Welding Company, 152 Jelliff Avenue, Newark, N. J. Full capacity can be obtained in either current when desired. The same winding of the armature serves for both currents, it being necessary to use only two collector rings for the alternating-current supply.

Either the alternating-current or direct-current leads of the generator can be short-circuited at the collector rings or commutator without injury as the generator voltage dies to a value that holds the current constant. The generator is ball-bearing and has a power take off at both ends for drive. It can be direct, chain or belt driven from any source of 7 hp.

Portable Electric Crane with Telescoping Boom

A telescoping boom with four settings between 12 ft. and 17 ft. is now offered by the Elwell-Parker Electric Company, Cleveland, with its portable electric cranes. The boom is all steel and raised or lowered by a special set of cables operated from an electric motor-driven hoist unit with two grooved drums. The heavy boom side channels are latticed and gusseted with a continuous ¼-in. steel plate extending above from the hoist cable sheave to the boom elevating sheave. The lower box or enveloping section of the boom is of formed plate steel, providing a very stout support for the telescoping portion.

By suitably locating the trip switch the distance from top of boom to the hook is but 23 in. The battery compartment carrying the hoist unit counterbalances the boom with the load on a steel crane column supported on ball and roller bearings. This column is set in a heavy pedestal firmly anchored in the main frame. The boom may be furnished with either hand or motor slew as required.

Immersion Heating Unit.—An electric immersion heating unit developed especially to meet the conditions incident to the melting of salts such as lavite, which is a good heat insulator when cold, has been placed on the market by Harold E. Trent, 259 North Lawrence Street, Philadelphia. The heating element itself is of the embedded type and is packed in a steel tube such that the temperature of the unit may be safely raised to 1,600 deg. before the initial heating of the salt takes place. They are made in sizes up to 1,500 watts, 18 in. long and 1.9 in. in diameter. For melting other material the wattage may be run considerably higher. The end connection can be supplied to meet the requirements of any particular application.

Safety Switch.—A new safety switch with a double-door construction, known as the WK-55, has been place on the market by the Westinghouse Electric & Manufacturing Company. The fuse-compartment door is interlocked with the handle while the main door is designed for padlocking and can be opened for inspection and testing without interrupting the service. The make-and-break mechanism is entirely contained in the operating handle. An arc quencher, consisting of metal laminations separated by layers of insulation and air space, is provided with this switch and is said to permit of breaking circuits carrying from 50 per cent more current in the larger sizes to 300 per cent more in the smaller sizes than the rated amperes of the switch, even at 500 volts.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

An exclusive agency is desired in Barcelona, Spain (No. 15,070), for electrical automobile supplies.

Purchase is desired in Hamilton, Canada (No. 15,038), of electric heaters and gas and electrical glassware.

An exclusive agency is desired in Johannesburg, South Africa (No. 14,999), for electrical hot-water heaters.

An exclusive agency is desired in Kobe, Japan (No. 14,982), for electric motors and generators.

Purchase is desired in Bombay, India (No. 15,063), of radio sets and parts.

Purchase is desired in Teneriffe, Canary Islands (No. 15,064), of radio sets and parts.

Purchase is desired in Aleppo, Syria (No. 1,500), of an electrical household refrigerating plant.

Purchase is desired in Victoria, Australia (No. 15,002), of tungsten rod for battery ignition contacts.

New Trade Literature

ELECTRIC HOISTS.—Catalog No. 3,200 issued by Alfred Box & Company, Inc., Trenton Avenue, East Toronto and Tioga Streets, Philadelphia, entitled "Electric Hoists," covers its various types of electric hoists. Important construction features of the "Box" electric hoists, together with illustrations showing some typical applications of the hoists, are included.

PANELBOARDS AND STEEL CABINETS.—The Frank Adam Electric Company, St. Louis, has issued catalog No. 35, which describes and illustrates the complete line of its circle "FA" "Triumph" standardized panelboards and steel cabinets. It contains a diagram of connections for a twelve-tenant circuit, six-meter fuse and a six-meter bar, meter-control panelboard installation, showing four two-wire and three three-wire meters, and a description of its major system, all-master-control system for theaters, auditoriums, fraternal buildings and schools is included.

LIGHTING STANDARDS.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued leaflet No. 20,232, covering the concrete lamp standards formerly manufactured by the Massey Concrete Products at its Milwaukee plant. It contains a description of the construction and application of the standards made by the "Hollowspun" process and shows the advantages over the old method of tamping the concrete into place. Illustrations of the various styles of ornamental street-lamp posts with diagrams and construction features are also included.

STEEL BUILDINGS.—"Truscon 'Standard'" is the title of a booklet issued by the Truscon Steel Company, Youngstown, Ohio, in which it describes the Truscon "Standard" steel buildings and products for manufacturers, architects, engineers, contractors, public utilities and works, railroads, etc. Illustrations are given showing the various uses of its products.

REFLECTORS.—"Cove Lighting" is the title of a booklet issued by the Pittsburgh Reflector Company, Pittsburgh, Pa., in which it describes the use of the Pittsburgh reflectors for indirect lighting. Illustrations are given showing various buildings using Pittsburgh reflectors. Attention is also called to its "Easy-to-Install" conduit system.

UNIT-TYPE SAFETY ENTRANCE SWITCH.—The American Electric Switch Company, Minerva, Ohio, is distributing a circular describing its unit-type safety entrance switch. It contains illustrations showing a two-circuit switch with main door and distribution fuse door open and also diagrams of connections.

EXPANSION TANK - TYPE TRANSFORMER.—Bulletin No. 2,043 issued by the Pittsburgh Transformer Company, Pittsburgh, Pa., describes the Pittsburgh expansion-tank-type transformers. Illustrations are given showing a 1,500-kva., single-phase transformer, self-cooled, with radiators, expansion-tank-type, and a 10,000-kva. polyphase transformer. A drawing shows the circulating device used with this type of transformer.

GRAPHIC METER.—Bulletin No. 525 issued by the Esterline-Angus Company, Indianapolis, describes the "Quick-Trip" graphic meter. Illustrations of the instrument are given with schematic diagrams of the control circuits to operate from excessive current in the neutral, from low voltage and from overload.

VENTILATING EQUIPMENT. — "How to Get Restaurant Ventilating Business" is the title of bulletin No. 1 issued by the sales and engineering departments of the American Blower Company, Detroit, which is the first of a series to be issued on the sale of ventilating equipment, together with a folder for filing this and other bulletins which will be issued regularly hereafter.

New Incorporations

THE GASCONADE POWER COMPANY, Hermann, Mo., has been incorporated with a capital stock of $164,000 by B. F. Eyer, 307 Land Bank Building, Kansas City, and S. W. Henderson, Excelsior Springs.

THE LOUISIANA PUBLIC SERVICE COMPANY, New Iberia, La., has been chartered with a capital stock of $200,000. J. G. Hix, is president, care of F. N. Kneland.

THE PLEASANT RIDGE ELECTRIC LIGHT & POWER COMPANY, Shelby, N. C., has been incorporated with a capital stock of $20,000 by L. V. Lee and G. L. Herrick, Route 4.

THE NORTHERN MARYLAND POWER COMPANY, Calvert Building, Baltimore, has been incorporated with a capital of $1,000,000, to take over and consolidate a number of electric companies operating in the northern part of Maryland. The incorporators are: E. H. Frost, Douglas H. Rose and Leslie E. Mihm.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

ALTON, N. H.—Extensions contemplated by the Alton Electric Light & Power Company during 1925 include the installation of a 25-amp., 2,300-volt induction feeder regulator, new switchboard equipment, etc. Raymond C. Duncan is secretary and manager.

NORTH CONWAY, N. H.—The Goodrich Falls Electric Company contemplates several miles of line extensions, the purchase of meters, transformers, etc. W. G. Meloon is manager.

WARREN, N. H.—The Warren Water & Light Company has contracted with the Bradford Electric Lighting Company for electricity, the service to be furnished by June 1. The Warren company may extend a 2,300-volt line to Breezy Point, a distance of 5 miles, and erect a 13,000-volt line to Ore Hill, 3 miles in length. It will also install from sixty to seventy additional meters and transformers on line extensions. E. S. Carbee is president.

MONSON, MASS.—The Ellis Company has awarded contract for the construction of a new building at its No. 1 mill, to cost about $80,000, which will be used as a dye-house, engine house and electric power plant.

WEST SPRINGFIELD, MASS.—The United Electric Light Company, Springfield, is considering building a new local plant, to cost about $1,000,000.

Middle Atlantic States

BUFFALO, N. Y.—The Niagara, Lockport & Ontario Power Company has petitioned the Public Service Commission for permission to extend its lines into the towns of Arkwright and Cold Spring and for authority to exercise franchises granted by the town boards.

FILLMORE, N. Y.—The Genesee Valley Power Company contemplates extending its system into the town and village of Rushford. H. G. Young is secretary.

LACKAWANNA, N. Y.—Bids will be received by the city of Lackawanna until June 5 for the construction of a new sewage-disposal plant and pumping station. Frederick K. Wing Company, Prudential Building, Buffalo, is engineer.

MIDDLETOWN, N. Y.—Application has been filed with the Public Service Corporation by the Rockland Light & Power Company, Nyack, the Orange County Public Service Corporation, Inc., and the Catskill Power Corporation, both of Middletown, asking consent to transfer certain hydroelectric properties of the Rockland and Orange County companies to the Catskill corporation, a newly organized corporation. It is stated in the petition that the Catskill corporation proposes to develop the hydroelectric power available on the Mongaup River and its tributaries and lease the power developed to the Rockland and Orange County companies. It is proposed to increase the output of the present plant on the Mongaup River by additions, construction of storage reservoirs, other power plants, etc.

MOUNT PLEASANT, N. Y.—Bids will be received by the Board of Supervisors of Westchester County, Court House, White Plains, until June 1, for furnishing and erecting lighting fixtures for the Nurses' Home and Employees' Dormitory in connection with the County Hospital in the town of Mount Pleasant, known as Grasslands Hospital. Walker & Gillette, 128 East Thirty-seventh Street, New York City, are architects.

NEW YORK, N. Y.—Bids will be received by the New York State Bridge and Tunnel Commission and New Jersey Interstate Bridge and Tunnel Commission, room 3,004 Woolworth Building, New York City, until July 7 for furnishing and delivering, but not installing, air-blast transformers and oil switches for use in the New York and New Jersey Ventilating Building of the Holland Tunnel. For details see Searchlight Section.

NORWOOD, N. Y.—The Norwood Electric Light & Power Company plans to extend its transmission lines to Raymondville, 5 miles distant. S. P. Phelps is president.

PERRY, N. Y.—The New York Central Electric Corporation has applied to the Public Service Corporation for permission to build an electric plant in Erwin, Bath, Hammondsport and West Sparta and for approval of franchises granted the company by the town boards.

SYRACUSE, N. Y.—Extensions and improvements contemplated by the Syracuse Lighting Company, Inc., during 1925 include the completion of the Teall Avenue substation at East Syracuse; building 11,000 and 23,000-volt switch houses, extension of 60-cycle, 2,300-volt generator bus, and installing three 1,000-kva., 60-cycle transformers at Fulton Street station; fireproofing transmission cables on 11,000-volt line from Solvay to Fulton Street and Fayette Street stations; erecting overhead feeders from Teall Avenue to Fulton Street substation, new subway construction due to canal abandonment and extending the municipal street lighting system. G. I. Vincent is manager.

YONKERS, N. Y.—The Alexander Smith & Sons Carpet Company, plans to build a power house at its mill.

ALLENHURST, N. J.—Extensions and improvements are contemplated by the Eastern New Jersey Power Company, Asbury Park, to its local plant, to cost about $250,000. It is proposed to increase the capacity of the power station to feed a high-tension line serving a wide territory in Monmouth and Essex Counties.

CAMDEN, N. J.—The installation of electric power equipment for the proposed sewerage-disposal plant to be built by the city at a cost of about $2,300,000, is under consideration. Remington & Vosbury, Camden, are consulting engineers.

BETHLEHEM, PA.—The installation of an improved lighting system on a number of streets, is under consideration by the City Council.

HARRISBURG, PA.—The City Council has authorized the installation of an automatic traffic control signal lighting system.

NEW CUMBERLAND, PA.—The Borough Council is considering the installation of new lighting system on several streets in the business section.

ST. MARYS, PA.—The St. Marys Clay Products Company plans to build a power house in connection with its proposed fireclay manufacturing plant, to cost about $400,000.

DOVER, DEL.—Plans are being considered to install an ornamental lighting system on Loockerman Street, consisting of fifty-six standards to cost from $12,000 to $15,000.

DOVER, DEL.—Arrangements have been made by J. Henry Hazel, Highland Park, a suburb, for the installation of ornamental lamps along Hazel Road in Highland Park.

WASHINGTON, D. C.—Bids will be received by the United States Coast Guard Headquarters, Washington, until June 8, for two 600-hp. Diesel oil engines.

WASHINGTON, D. C.—Bids will be received by the Constructing Quartermaster until May 28 for the installation of a street-lighting system, oil breakers, transformer and wharf lighting at the Washington Barracks, D. C.

WASHINGTON, D. C.—Bids will be received by the Chief Signal Officer, United States Army, Washington, until May 29, for radio-telegraph transmitters, in lots of 1 and 2 (Proposal C.P. 21187-L).

WASHINGTON, D. C.—Bids will be received by the Chief of Air Service, United States Army, until May 26, for 500 starting switches, 500 safety push-buttons and 600 switch assemblies (Circular CAS 117), and 300 storage batteries (Circular CAS 116).

WASHINGTON, D. C.—Bids will be received by the General Purchasing Officer, Panama Canal, Washington, until June 6, for 3,000 ft. power cable, 1,000 ft. single conductor wire, two 7½-kva. transformers, snap switches, renewable fuses, steel reflectors, watertight receptacles and switchboard cords (Panama Circular 1671).

North Central States

GREGORY, MICH. — L. N. McAleer, owner of the local electric light plant, contemplates moving the plant to secure more head of water, tripling the power facilities.

CINCINNATI, OHIO. — Electric power equipment will be installed in the proposed printing and publishing plant to be erected by the Cincinnati *Enquirer*, at a cost of about $3,000,000.

CLEVELAND, OHIO.—Preliminary steps have been taken for the installation of an ornamental lighting system on Superior Street between East Twelfth Street and East Fifty-fifth Street, to be maintained by underground wires.

TONIEVILLE, KY.—Contract has been awarded to the Kentucky Utilities Company, Louisville, to furnish electric light and power service here.

WHITING, IND.—Plans for the proposed local tank car works of the Union Tank Car Company, 21 East Fortieth Street, New York, to cost about $300,000, include a power plant.

BARTONVILLE, LLL.—Extensions are contemplated by the Central Illinois Light Company, Peoria, to its local system, to cost about $500,000. The work will include the erection of a transmission line from the East Peoria power plant to Bartonville with the erection of a substation which will double the capacity of the present service. The substation will cost about $150,000.

CHICAGO, ILL.—Plans are under way for the installation of an ornamental lighting system on State Street, between Lake and Van Buren Streets, by the State Street Business Men's Association and John T. Miller, commissioner of gas and electricity. The proposed scheme involves the removal of trolley poles from the curbs and the support of trolley wires by guys attached to buildings. The present plans call for the erection of about 140 new lamp standards. A similar scheme of illumination for Van Buren Street from Michigan Avenue to the river has been approved by the Van Buren Street Improvement Association.

BARABOO, WIS.—Extensions are contemplated by the Merchants' Power & Light Company, to cost about $20,000. The work will include the construction of a new concrete flume, installation of a waterwheel and generator at its Glenville hydro-electric plant and extensions of its rural transmission lines in Greenfield, Barbaboo and in the state park at Devils Lake.

GREEN BAY, WIS. — The Northern Paper Mills have purchased an undeveloped hydro-electric power site on the Menominee River, east of Amberg, which it plans to develop in about two years. Work has started on the erection of a steel-tower transmission line from White Rapids to the Northern Paper Mills in Green Bay. The work is being done by its own engineering and construction force. This transmission line will be a link in the line being erected by the Wisconsin Gas & Electric Company, Racine, which will connect Milwaukee with its properties at Twin Falls. H. W. Gochnauer is plant engineer.

MARINETTE, WIS.—Bids are being received by the Menominee & Marinette Light & Traction Company, Menominee, Mich., for the construction of a substation here, to cost about $40,000. Derrick Hubert, Menominee, Mich., is engineer.

MILWAUKEE, WIS.—Plans have been completed by the Milwaukee Electric Railway & Light Company for the erection of a 132-kv. transmission line from Plymouth to Appleton, a distance of 40 miles, where it will connect with the lines of the Wisconsin Traction, Light, Heat & Power Company.

WILD ROSE, WIS.—The hydro-electric plant and distributing system of the Rose Milling Company has been acquired by the Wisconsin Power & Light Company, Madison. The erection of a transmission line to connect the local system with its main transmission system is contemplated by the Wisconsin company.

FARIBAULT, MINN.—The City Council has contracted with the Northern States Power Company, Minneapolis, for rebuilding the ornamental lighting system in the business district. It is proposed to replace the present cluster lamps with standards mounted with single lamps of 250 cp. and 400 cp.

HIBBING, MINN.—Work on the proposed municipal electric power plant, recently started, has been held up by an injunction.

WINTHROP, MINN.—Bids will be received by A. L. Maim, city clerk, until May 25 for installing an electric distribution system and street-lighting system, pumping equipment, etc., to cost about $25,000.

ACKLEY, IOWA.—Extensions and improvements are not contemplated to municipal electric light plant, the ELECTRICAL WORLD is informed, as reported in the issue of April 11.

MASON, IOWA. — W. N. Albertson & Company, First Wisconsin National Bank Building, Milwaukee, has acquired the system of the Mason Light & Power Company, including the hydro-electric property and water plant. The company will rebuild the local distribution at once and extend its transmission lines to Grandview, Drummond, Cable, Benoit, Sanborn and other neighboring communities. The hydro-electric plant will be rebuilt and the generating capacity increased.

CHRYSTAL CITY, MO. — The Union Electric Light & Power Company, St. Louis, which is furnishing electricity to the plant of the Pittsburgh Plate Glass Company, has acquired the local distribution system and will replace the present 250-volt direct-current service with alternating-current service, which will involve the changing over of all motors and other appliances.

JOPLIN, MO.—The Commerce Mining & Royalty Company plans to build a power plant near the Tar River, to cost about $40,000.

SALEM, MO.—The Salem Light & Power Company will install either a 150-hp. or 200-hp. oil engine directly connected to generator within the next three months and establish a twenty-four-hour service. C. A. Wallof is secretary and manager.

TRENTON, MO.—The Trenton Gas & Electric Company has appropriated about $90,000 for extensions and improvements in its system, including the installation of new equipment.

CULBERTSON, NEB. — M. M. Bree, owner of the local electric plant, contemplates the installation of an additional 150-hp. generating unit.

MASKELL, NEB.—Arrangements have been made to secure electricity from a transmission line for local service. The local, privately owned, plant will be closed down.

SCHUYLER, NEB. — Bids have been called, to be open May 26, for a new 200-hp. boiler, stoker, superheater and auxiliary equipment for the municipal electric light plant. J. A. Kubik is superintendent.

UNIVERSITY PLACE, NEB.—The installation of an ornamental lighting system is under consideration by the city officials. James Craig is superintendent of the municipal electric plant.

RICHMOND, KAN.—The Public Service Commission has granted the Municipal Power Transmission Company, recently organized, permission to do business in Franklin and other counties.

Southern States

GREENSBORO, N. C.—Tentative plans are under consideration by the City Council for the installation of an ornamental lighting system on Green Street.

SANFORD, N. C.—Plans for the proposed local plant of the Borden Brick & Tile Company, Goldsboro, to cost about $150,000, include a power house.

KINGSTREE, S. C.—The South Carolina Power & Light Company is erecting a 90-mile, 33,000-volt transmission line, now about half completed. F. B. Adams is general manager.

AMERICUS, GA.—The City Council is considering the installation of an ornamental lighting system in the business district.

BRUNSWICK, GA.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until June 16 for installing an electric lighting plant at the United States quarantine station, Brunswick. For details see Searchlight Section.

OKEECHOBEE, FLA.—Bids will be received by the Mayor and Council of the city of Okeechobee until June 1 for improvements to waterworks, including a 1,000,000-gal. filtration plant and pumping station with equipment complete, consisting of two 1,000-gal.-per-minute intake pumps and motors, or other drive; one 350-gal.-per-minute service pump and motor, or other drive, and one 750-gal.-per-minute service pump with motor or other drive, all pumps to be complete with starting and control equipment. F. E. Lawrence, Okeechobee, is engineer.

PANAMA CITY, FLA. — The Econfina Power Company, recently organized with a capital of $500,000, plans to build a hydro-electric plant on Econfina Creek, to cost about $300,000. W. P. Sherman is president.

ST. CLOUD, FLA.—The Chamber of Commerce has adopted a resolution requesting the City Commission to ask the Legislature for authority to issue $500,000 in bonds for public improvements, of which $60,000 would be used for new equipment and extension of the municipal lighting system.

CHATTANOOGA, TENN.—The McCallie Avenue Improvement Association is negotiating with the Tennessee Electric Power Company for the installation of an ornamental lighting system on that thoroughfare from the McCallie Avenue viaduct to Highland Park Avenue.

MOBILE, ALA.—Bids will be received by the Board of Commissioners of the City of Mobile until June 2 for the installation of ornamantal lighting systems as follows: Venture. No. 1, 172 lamps; No. 2, 192 lamps; No. 3; 231 lamps, and No. 4, 150 lamps, all to include transformers, standards, fittings, overhead and underground feed wires. Plans and specifications are on file in the office of the city engineer. Andrew A. Coffin is electrical engineer.

THORSBY, ALA.—The Alabama Power Company, Birmingham, has acquired the municipal electric plant and plans to erect a transmission line in this section.

GREENWOOD, MISS.—The installation of a new street-lighting system in the business district is under consideration by the Water and Light Commission. Floyd Hurt is superintendent of distribution.

PONTOTOC, MISS.—The Board of Aldermen has accepted the proposition submitted by the Mississippi Power Company to purchase the municipal electric plant. The company will erect transmission lines to connect up the local plant with its other properties. L. E. Price is superintendent of the municipal electric plant.

ASHDOWN, ARK.—Plans are being considered for rebuilding the plant of the Ashdown Ice & Light Company, recently acquired by the Texas Central Power Company, San Antonio, Tex.

BEARDEN, ARK. — Arrangements are being made by the Arkansas Light & Power Company, Pine Bluff, which has been granted a franchise here, to erect a transmission line from Fordyce to Bearden, a distance of 14 miles, to furnish electricity here.

CARTER, OKLA.—Bids submitted for the erection of a transmission line from Carter to Elk City have been rejected by the City Council. V. V. Long & Company, 1300 Colcord Building, Oklahoma City, are engineers.

FREDERICK, OKLA.—Plans are being considered by the City Council for extensions and improvements in the municipal electric power plant to cost about $160,000.

HASTINGS, OKLA.—The City Council is arranging a bond issue of $10,000 for the erection of a transmission line to Temple, where it will connect with the system of the Southwestern Light & Power Company, Lawton. A contract has been made with the company to furnish electricity here.

OKMULGEE, OKLA.—The installation of an ornamental lighting system in the business district, to cost about $10,000, is under consideration by the City Council.

PLAINVIEW, TEX. — Negotiations are under way by the Community Power & Light Company, Fort Scott, Kan., to acquire the electric properties of the Texas Utilities Company, in Plainview, Lubbock and vicinity.

Pacific and Mountain States

BELLINGHAM, WASH. — The Puget Sound Sawmills & Shingle Company plans to install electric power equipment in connection with the rebuilding of its mill, recently damaged by fire, with loss of about $250,000. J. H. Kane is president.

FERNDALE, WASH. — The Whatcom County Power & Light Company contemplates the erection of a 6,600-volt transmission line on Sunset Avenue.

SEATTLE, WASH.—Plans are being considered by the city lighting department for the installation of floodlighting systems, searchlights, etc., on a number of municipal buildings, including the department warehouse on Fourth Street South.

TIETON, WASH.—The Pacific Power & Light Company, Portland, Ore., is considering extending its transmission lines into the Tieton irrigation district. One line will be extended to Telton, a distance of 5½ miles, and the other into the Naches Heights district, a distance of about 7 miles.

PORTLAND, ORE. — The West Coast Power Company, Portland, has applied to the Commissioners of Wahkiakum (Wash.) Commissioners for permission to erect transmission lines across Puget Island and along the county roads in districts 1, 2, and 6.

FRESNO, CAL.—Plans are under way by the San Joaquin Light & Power Corporation, Fresno, for the construction of a substation at Kingsburg, to cost about $250,000; also one at Le Grand, to cost about $300,000.

FRESNO, CAL.—The City Council has authorized the installation of ornamental lamps, using about fifty combination steel and cast-iron standards, on South Sixth, Seventh, Eighth, Ninth, Tenth, and Eleventh Streets and Patt Avenue.

LOS ANGELES, CAL.—Plans are being prepared by the Los Angeles Gas & Electric Corporation for an operating building at 1324 Wall Street, including electrical department, meter department, shops, etc., to cost about $200,000.

SAN FRANCISCO, CAL.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until May 26, for a quantity of electrical equipment for the Mare Island Navy Yard, including telephone wire, steel junction boxes, safety inclosed switches, motor-starting and speed-regulating rheostats, lightning arresters, pin insulators, crossarms, etc. (Schedule 3724.)

SPRINGER, N. M.—The Springer Light & Power Company is planning to install a 10,000-gallon storage tank to enable it to burn distillate. Frank C. Folz is proprietor.

Canada

TIMMINS, ONT. — An agreement has been reached between the Abitibi Power & Paper Company, the Hollinger Consolidated Gold Mines and the Northern Canada Power Company by which the Abitibi company takes over the Hollinger's Island Falls power developments and the Northern Power Company will supply Hollinger mines. As a result of the arrangement the Abitibi company will go ahead with its plans to increase its newsprint output from 500 tons to 800 tons daily, which will require 35,000 hp., which the Hollinger plant will develop. The present capacity of the Hollinger plant is 25,000 hp.

TORONTO, ONT.—Plans are under consideration by the Harbor Commissioners for moving the Hydro-Electric power line at Sunnyside to another location. The project will include new steel towers, concrete footings, cables, etc. The cost is estimated at about $50,000.

MONTREAL, QUE. — Work will soon start by the Montreal Light, Heat & Power Consolidated on the construction of a new substation near the intersection of St. Catherine and Bleury Streets. The initial installation will consist of two units of 30,000 kw. each. The station is designed to meet future needs.

Electrical Patents

Announced by U. S. Patent Office

(Issued April 21, 1925)

1,534,681. ROTARY SWITCH HANDLE; G. Butzke, Alplaus Road, N. Y. App. filed June 4, 1921.

1,534,682. ELECTRIC HEATER; S. M. Carmean and J. H. Carmean, Kansas City, Mo. App. filed April 11, 1924. Bowl-reflecting type.

1,534,683. MOUNTING FOR SWITCH-OPERATING MEANS; F. E. Case and A. T. Crocker, Schenectady, N. Y. App. filed Nov. 14, 1921. In control apparatus.

1,534,688. ELECTRIC WELDING DEVICE; W. B. Collins, Raleigh, N. C. App. filed Aug. 29, 1923. Arc-electrode type.

1,534,689. ELECTRIC HEATING DEVICE FOR BURNING AND DRYING PURPOSES; W. Cooper, Huddersfield, England. App. filed Dec. 14, 1922.

1,534,695. ELECTRICAL JUNCTION BOX; F. Doucnet, Paris, France. App. filed Sept. 2, 1924. For extra-high-tension multicore cables.

1,534,697. PROTECTIVE SYSTEM; A. S. Fitzgerald, London, England. App. filed Aug. 13, 1924. Current transformers of the circulating current type.

1,534,703. WIRE HANGER; A. J. Gurney, Canton, Ohio. App. filed June 14, 1924.

1,534,704. RECEIVING SYSTEM FOR RADIANT ENERGY; J. H. Hammond, Jr., Gloucester, Mass. App. filed Sept. 9, 1918.

1,534,706. ELECTRIC SOCKET STRUCTURE; M. Herskovitz, Chicago, Ill. App. filed April 28, 1920. Candle-socket type.

1,534,709. METHOD OF CONDUCTING ELECTROLYTIC OPERATIONS; F. A. Holt, Elmhurst, N. Y. App. filed May 17, 1924. Method of depolarizing the electrodes.

1,534,719. RADIO RECEIVING SYSTEM; E. W. Kellogg, Schenectady, N. Y. App. filed April 21, 1921. Plurality of widely separated receiving antennas connected by transmission lines.

1,534,720. RADIO RECEIVING SYSTEM; E. W. Kellogg and C. W. Rice, Schenectady, N. Y. App. filed May 18, 1921.

1,534,723. SECTIONAL SWITCH BOX; E. H. Lewis, Bridgeport, Conn. App. filed Aug. 1, 1924.

1,534,724. AUTOMATIC SWITCHING SYSTEM; G. R. McDonald, Schenectady, N. Y. App. filed April 8, 1924. For controlling the connection between a source of current and a load circuit.

1,534,727. SLEET CUTTER FOR TROLLEY WIRES; G. S. Moore, Indianapolis, Ind. App. filed Jan. 4, 1924.

1,534,733. ELECTRIC HEATER; M. H. Perez, San Pedro Sula, Honduras. App. filed Oct. 8, 1923. For fusing metals.

1,534,749. ELECTRICAL APPARATUS CASING; M. O. Troy, Pittsfield, Mass. App. filed May 27, 1922. For oil-cooled transformers, etc.

1,534,750. MOTOR CONTROL SYSTEM; H. H. Vernon, Schenectady, N. Y. App. filed May 5, 1924. In which the motor is operated between predetermined limits.

1,534,778. ELECTRIC HEATER; W. A. Goodman, Los Angeles, Cal. App. filed Dec. 27, 1923.

1,534,823, 1,534,824. ELECTRIC TABLE STOVE; H. A. Ziola, Toledo, Ohio. App. filed April 23, 1924.

1,534,886. BURGLAR-PROOF DEVICE; H. H. Allison, Fairmont, Minn. App. filed July 30, 1921. For vault, cash box, etc.

1,534,898. WATER HEATER; L. I. Bluemlein, Hartsdale, N. Y. App. filed May 13, 1924.

1,534,909. ELECTRICAL GAGE; R. C. Browne, Salem, Mass. App. filed Oct. 10, 1921. For measuring the liquid in a tank.

1,534,945. ELECTRIC RELAY; F. B. L. Hain, Malmo, Sweden. App. filed Aug. 9, 1922. To cut in or out the main line automatically from a network.

1,534,946. IRON; R. F. Hall, Harrisburg, Ill. App. filed July 31, 1922. Of triangular shape so that it can be pushed in different directions without turning it.

1,534,953. ELECTRIC PAINT AND VARNISH SCRAPER; C. J. Hohman, Rockaway Park, N. Y. App. filed Oct. 31, 1923.

1,534,970. PRODUCTION OF ELECTRICAL OSCILLATIONS BY MEANS OF THERMIONIC VALVES; N. Lea, London, England. App. filed May 10, 1921.

1,535,037. METHOD FOR HIGH-FREQUENCY TELEPHONY WITH OR WITHOUT A LINE; L. Pungs, Berlin-Charlottenburg, Germany. App. filed Aug. 23, 1921.

1,535,046. KEY CONNECTION FOR THE WIRELESS TRANSMISSION OF MESSAGES; O. Scheller, Berlin-Lighterfelde-West, Germany, and R. Herzog, Berlin, Germany. App. filed Aug. 31, 1921.

1,535,057. ELECTRICAL POWER TRANSMISSION SYSTEM; A. M. Taylor, Erdington, Birmingham, England. App. filed June 11, 1921. Cable polyphase system.

1,535,073. SYNCHRONOUS TELEGRAPH SYSTEM; J. V. Foll, London, England. App. filed Jan. 26, 1923.

1,535,074. TROUBLE INDICATOR FOR TELEGRAPH SYSTEMS; W. A. Houghtaling, Dunellen, N. J. App. filed Jan. 27, 1923.

1,535,079. HEATING SYSTEM FOR ELECTRIC RAILWAY CARS; W. J. Smith, St. Paul, Minn. App. filed Aug. 25, 1922.

1,535,082. ELECTRON DISCHARGE DEVICE; E. F. Alexanderson, Schenectady, N. Y. App. filed Sept. 28, 1920. Adapted to the controlling and amplifying of electrical currents.

(Issued April 28, 1925)

16,054 (reissue). ELECTRIC FURNACE; W. E. Moore, Beaver Falls, Pa. App. filed Sept. 13, 1921. Arc-type metallurgical furnace.

1,535,088. RECTIFIER; J. R. Barnhart, Cleveland, Ohio. App. filed Oct. 6, 1920. Mechanical type.

1,535,094. TRANSFORMER; R. V. Bingay, Pittsburgh, Pa. App. filed Sept. 29, 1920. Oil-cooled; using special impregnating varnish.

1,535,104. MEANS FOR PREVENTING ELECTRICAL INTERFERENCE; S. I. Cory, Elmhurst, N. Y. App. filed May 6, 1922. In grounded telegraph circuits.

1,535,108. CARBON ELECTRODE FOR VACUUM LIGHTNING CONDUCTORS; S. T. Dahl, Stockholm, Sweden. App. filed Feb. 28, 1923.

1,535,117. CABLE CONNECTOR; I. Fulton and C. A. Boustead, Cresaps, W. Va. App. filed March 27, 1923. As used in mines.

1,535,122. PERMANENT HAIR-WAVING MACHINE; G. Lantieri, Jersey City, N. J. App. filed Oct. 19, 1922.

1,535,123. ELECTRIC HEATER FOR PERMANENT-WAVING MACHINES; G. Lantieri, Jersey City, N. J. App. filed Oct. 19, 1922.

1,535,130. HIGH-POWER RADIO TELEPHONY; A. A. Oswald, East Orange, N. J. App. filed March 20, 1924.

1,535,176. REMOTE-CONTROL TYPEWRITING MECHANISM; I. Nachumsohn, Winnipeg, Manitoba, Canada. App. filed Aug. 12, 1922. For line or wireless telegraphy.

1,535,182. ARRANGEMENT FOR AMPLIFYING HIGH-FREQUENCY CURRENTS; W. Schaffer, Berlin, Germany. App. filed Aug. 18, 1922.

1,535,185. ELECTROLYTIC APPARATUS; C. G. Spencer, New York, N. Y. App. filed Jan. 26, 1920. For electrolysis of water.

1,535,189. RADIO COMMUNICATION APPARATUS; R. E. Thompson, New York, N. Y. App. filed March 7, 1919.

1,535,240. CONTROLLER FOR FUEL IGNITERS; W. L. Morris, Chicago, Ill. App. filed Sept. 11, 1922.

1,535,244. TELEGRAPHY; H. S. Percival, Bloomfield, N. J. App. filed May 20, 1920. "Single" telegraph system.

1,535,269. SELECTIVE SIGNALING APPARATUS AND CIRCUITS; J. F. Toomey, New York, N. Y. App. filed Oct. 10, 1919. For telephone system.

1,535,276. TELEPHONIC ELECTRODE AND METHOD OF CONSTRUCTING SAME; F. L. Whitaker, Olney, Ill. App. filed June 11, 1921.

1,535,287. AUTOMATIC HUMIDIFIER; E. B. Beeler, Chicago, Ill. App. filed March 26, 1923.

1,535,306. CONTROLLING MEANS FOR ELECTRICAL DEVICES; J. E. Harvey, Dorchester, Mass. App. filed Sept. 13, 1923. As flatirons.

1,535,307. ELECTRIC MELTING POT; R. C. Hawk, Pittsburgh, Pa. App. filed Oct. 17, 1922.

1,535,318. APPARATUS FOR ELECTROPLATING; I. J. Koehnline, Bridgeport, Ohio, and W. E. Armstrong, Martins Ferry, Ohio. App. filed Aug. 16, 1923.

1,535,329. MEANS FOR OBTAINING THE POLAR DIAGRAM OF AN ALTERNATING-CURRENT WAVE; J. T. MacGregor-Morris and F. R. F. Ramsay, London, England. App. filed Feb. 5, 1923.

1,535,360. ELECTRIC HOUSE OR LIGHTING CIRCUIT; H. F. Vickery, Wellington, New Zealand. App. filed June 29, 1923.

1,535,365. WELDING ELECTRODE; G. E. Doan, Cleveland, Ohio. App. filed Nov. 12, 1921.

1,535,390. SWITCHING APPARATUS; J. H. Wyatt, Kirklyn, Pa. App. filed Feb. 17, 1923. Automatic circuit-breaker mechanism.

1,535,394. SHOE HEATER; W. H. Raynard, Boston, Mass., and F. W. Eager, Brookline, Mass. App. filed April 12, 1921.

1,535,400. METHOD AND APPARATUS FOR FORMING TUBING ELECTROLYTICALLY; R. Crowell, Winchester, Mass. App. filed Jan. 11, 1922.

Financial and Corporate

Utilities Shares All Jump

Whole Procession of Stocks Moves Into New High Ground in Best Market of Year

CONTINUED and pronounced ease in money rates and strength in the general securities markets, not to mention the growth in confidence concerning future business, may have helped to open the gate to the bulls in the public utility market last week. At any rate an old-fashioned bull market developed, and in it a long line of issues moved into new high ground for the year and all time. Merger possibilities nowadays fire the imaginations of speculators, and then too the sound condition of the industry is attracting many investors among the rank and file.

News that Commonwealth Power Corporation was planning to purchase control of the Tennessee Electric Power Company on the basis of terms described elsewhere in this issue stimulated buying of Commonwealth in such enormous blocks that its activity became one of the week's features. The common stock jumped about twenty-three points during the week to a level that had never been reached before, the warrants rising with the stock.

Next in importance among the issues to advance sharply was, perhaps, Southeastern Power & Light Company's common stock, which rose twenty-four points to around 105. The new peak is equivalent to twice the recorded figure, or to 210, for the old Alabama Traction, Light & Power Company's stock, which sold only about a year ago around 30 or 40. The rise last week came upon a relatively small volume of buying. Dealers report that they have been unable to purchase large blocks without bidding the price up sharply against themselves. It is known that while Southeastern for 1924 will show a gross business of about $9,000,000, the gross for 1925, when the enlarged system will be in operation, should be nearer $18,000,000.

The rise of Electric Bond & Share Securities, amounting to more than thirteen points, was not so pronounced as that in some other issues but represented an enormous turnover of stock. The movement in this stock was stronger than any that has developed since the break that came shortly after trading in the issue began. Both American Superpower and Electric Investors were strong, each adding something like five points to its position of the week before. Substantial gains were made by United Gas & Electric, General Gas & Electric, Lehigh Power Securities, Mississippi River Power and numerous other issues.

On the big board American Water Works & Electric again led the procession, that stock establishing a new high for itself at around 63, a price that is the equivalent to well over 300 for stock that sold in 1924 as low as 40. Virginia Railway & Power touched 119¾, only to break thirteen points on Monday. North American Company again touched 50, and Detroit Edison set a new top.

Electric Power and Light Bids for Southern Utilities

Negotiations are now pending which it is expected will result in the acquisition and control of the properties of the Southern Power & Light Company by the Electric Power & Light Corporation under the supervision of the Electric Bond & Share Company. The Southern Power & Light Company, organized under the laws of the State of Maryland to acquire the business and property of the Southern Power & Light Company (Delaware), owns or controls through stock ownership the Arkansas Light & Power Company, the Mississippi Power & Light Company, the Louisiana Power Company and the Louisiana Power & Light Company and indirectly, through the Arkansas Light & Power, the Pine Bluff Company. The service of the controlled companies extends throughout a large territory in Arkansas, Louisiana and Mississippi estimated to have a population in excess of one million.

The Electric Power & Light Corporation, in addition to holding the stocks of the present subsidiaries of the Southern Power & Light Company, will hold a substantial majority of all of the common stocks (and in some cases varying amounts of preferred and second preferred stocks as well as certain indebtedness) of New Orleans Public Service, Inc., Dallas Power & Light Company, Dallas Railway Company, Utah Power & Light Company, Power Securities Corporation (which owns all the common stock and certain other securities of the Idaho Power Company) and Texas Interurban Railway. These companies furnish, directly or indirectly, electric power and light, electric railway, gas and other public utility service in 253 communities, with a wide industrial and geographical diversification, located in Louisiana, Texas, Utah, Colorado, Idaho, Wyoming and Oregon.

Contingent on this program being carried out, holders of the cumulative participating preferred stock of the Southern Power & Light Company will be afforded the privilege for a limited time of exchanging each share of preferred stock, without nominal or par value, now held by them for one share of preferred stock, without nominal or par value, of Electric Power & Light Corporation and one-half share of common stock, without nominal or par value. The consolidation of the properties of the Southern Power & Light Company with the Electric Power & Light Corporation will result in placing all of these properties under the supervision of the Electric Bond & Share Company.

Dividends Declared

During the past week the following quarterly dividends were announced by electric light and power companies and electrical manufacturing companies:

Name of Company	Per Cent	When Payable
Baton Rouge Electric, com.	$5	June 1
Central Indiana Power, pf.	1½	June 1
Georgia Ry. & Power, com.	1	June 1
Middle West Utilities, prior lien.	$1.75	June 15
Nebraska Power, pf.	1¾	June 1
Niagara Falls Power, com.	50c.	June 15
Niagara Falls Power, pf.	43¾c.	July 15
North American Utility Securities, first pf. allotment cer.	$1.50	June 15
Northern Ohio Trac. & Lt., 6% pf.	1½	July 1
Northern Ohio Trac. & Lt., 7% pf.	1¾	July 1
Northwestern Public Service, pf.	1¾	June 1
Philadelphia Electric, com.	50c.	June 15
Philadelphia Electric, pf.	50c.	June 15
Rochester Gas & Electric, 5% pf.	1¼	June 1
Rochester Gas & Electric, 6% pf.	1½	June 1
Rochester Gas & Electric, 7% pf.	1¾	June 1
Vesta Battery, pf.	1¾	June 1

Company Reports

The following reports were issued during the past week by electric light and power companies for the month of March:

Name of Company	Gross Earnings for March 1925	1924
Adirondack Power & Light*	$647,636	$587,448
Appalachian Power*	317,414	272,401
Associated Gas & Electric	771,202	270,627
Central Power & Light	482,742	447,643
Detroit Edison*	†2,935,950	†2,850,735
Federal Light & Traction	496,259	490,593
Jamaica Public Service	50,730	50,012
Manila Electric*	292,079	288,967
Northern Ohio Power*	950,147	852,188
Public Service Corp. of N. J.*	7,830,952	7,156,828

* April. † Includes other revenue.

Westinghouse Sales Total $157,880,000

The gross earnings of the Westinghouse Electric & Manufacturing Company for the year ended March 31, 1925, were $157,880,292, as shown by the company's annual report, which was issued this week. This compares with $154,413,000 for the previous year.

The cost of sales was $144,242,065, leaving a net manufacturing profit of $13,638,227. Other income was $4,203,179, and the gross income from all sources was $17,841,406. After deducting interest charges, etc., of $2,517,042, the net income available for dividends and other purposes was $15,324,364. The dividends paid on the preferred and common stock were $9,468,221, and the amount added to surplus was $5,612,606. The value of unfilled orders at the close of the fiscal year was $55,271,908, compared with $63,738,700 at the close of the previous fiscal year.

In his report to the stockholders, Guy E. Tripp, chairman of the board, stated that in pursuance of a plan of decentralization by departments with the ultimate view of retaining at East Pittsburgh mainly the manufacture of heavy electrical machinery, certain lines of products had been transferred to Works at Sharon, Pa., South Philadelphia and other places.

"It is believed," said Mr. Tripp, "that your manufacturing facilities are now better arranged and that the designs of your company's products are now better adapted to meet the requirements of the future than ever before."

Municipal Service Company Offers Notes

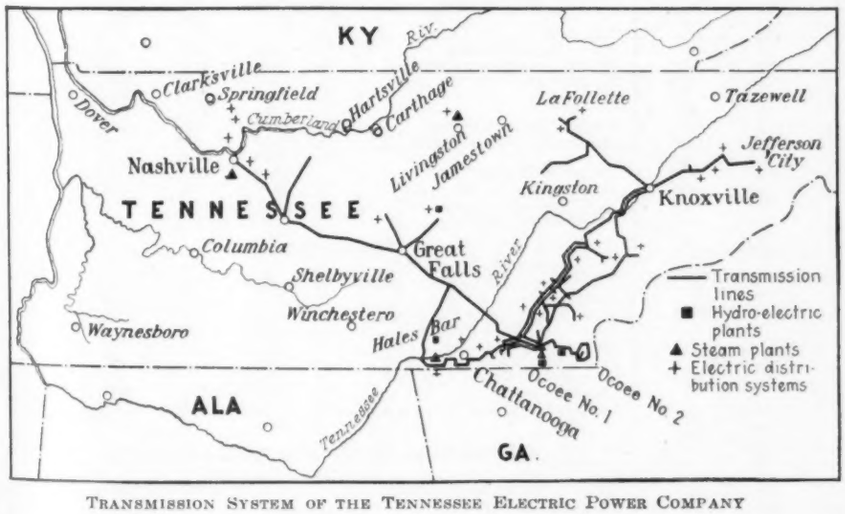
During the past week the Municipal Service Company floated an issue of three-and-one-half-year 6 per cent gold notes, totaling $3,250,000, at 99½ and interest to yield more than 6.15 per cent. The Municipal Service Company owns or controls local operating public utility companies, serving with electric light and power, gas, ice or steam 184 communities in Pennsylvania, Virginia and Georgia. The proceeds of these notes, which will be the direct obligation of the company and will be closed to further issuance, will provide funds with which to purchase control of the Keystone Public Service Corporation.

Commonwealth Soon May Get Tennessee

Enlarging Commonwealth Power Corporation Through the Acquisition of Tennessee Electric Power Would Swell Gross to $41,000,000

BY PAUL WILLARD GARRETT

GEORGE E. HARDY, president of the Commonwealth Power Corporation, last week announced that the directors of his organization have authorized the submission of a plan to stockholders for the acquisition of control in the Tennessee Electric Power Company. The two organizations, Commonwealth Power Corporation and Tennessee Electric Power Company, long have been identified with the same management bankers. These bankers, Hodenpyl, Hardy & Company of New York and E. W. Clark & Company of Philadelphia, and certain of the large stockholders now feel that the extensive Tennessee operating properties should be placed under control of the same holding company that has jurisdiction over other operating properties of the system.



TRANSMISSION SYSTEM OF THE TENNESSEE ELECTRIC POWER COMPANY

No final statement of the proposal has been made, but the present plan is to exchange the second preferred stock of the Tennessee Electric Power Company for the preferred stock of Commonwealth Power Corporation on the basis of share for share. The common stock of Tennessee in turn would receive for each share thirty-five-hundredths of a share of preferred and twenty-five-hundredths of a share of common stock in Commonwealth.

Acquisition of Tennessee by Commonwealth would be the most significant step toward expansion that the latter holding utility has taken. The Commonwealth Power Corporation already controls valuable properties in addition to the well-known Consumers Power Company of Michigan. Commonwealth owns the common stocks of the Consumers Power Company, Central Illinois Light Company, Illinois Power Company, Illinois Electric Power Company, Southern Indiana Gas & Electric Company, Ohio Edison Company and Utilities Coal Corporation. Growth of what now is the Commonwealth system has been persistent, steady and enormous during the last decade or so. Electric sales in kilowatt-hours have grown from 165,451,517 in 1912 to no less than 645,310,109 in the year ended March 31, 1925. In the same period electric customers grew in number from 57,429, to 291,529.

Consummation of the new plan would give Commonwealth rank among the country's larger power and light enterprises. Gross revenues of the Commonwealth Power Corporation and its subsidiaries for the year ended March 31, 1925, totaled $31,531,305 and gross revenues for the Tennessee Electric Power Corporation in the year 1924 totaled $9,570,783.

Thus the enlarged Commonwealth would be able to show a gross business immediately in excess of $41,000,000. Moreover, the two most interesting subsidiaries of the enlarged Commonwealth, the Consumers Power Company and the Tennessee Electric Power Company, would offer special promise of continued growth. The Michigan and Tennessee sections are developing rapidly. To the present diversified Commonwealth centers would be added a large part of the State of Tennessee, including such places as Nashville, Chattanooga and Knoxville.

While unification of the Tennessee Electric Power Company with the Commonwealth interests would make feasible certain operating economies not possible under the present arrangement, thus saving substantial amounts for stockholders and enabling the system to give better service to customers, it would also open up to Commonwealth an interest in the superpower development of the South. Tennessee Electric Power is an important part of the superpower system that connects such properties as the Alabama Power Company, Georgia Railway & Power Company and others.

What the addition of Tennessee would mean for Commonwealth common stockholders in the way of increased earnings it is too early to say. However, the Tennessee earnings are increasing persistently, and in 1924 the amount available after fixed charges was $2,548,105.

Annual Meeting of Crocker-Wheeler Stockholders.—At the annual meeting of the stockholders of the Crocker-Wheeler Company held at Ampere, N. J., May 13, the following directors were re-elected: Edward W. Brown, Arthur L. Doremus, Hampton D. Ewing, Theodore S. Fuller, Ernest B. Humpstone, Frank H. Jones, Edmund Lang, Herbert C. Petty, Michael I. Pupin. The following officers were re-elected: Edmund Lang, president; Arthur L. Doremus, vice-president; Herbert C. Petty, secretary, and Theodore S. Fuller, treasurer.

New York Group of Utilities Changes Par.—A group of eleven electric light and power companies serving territory on the east shore of the Hudson River from Westchester County to the Canadian line simultaneously filed certificates in the office of the Secretary of State changing the par value of their capital stock from a stated amount to non-par value. A consolidation of these companies into one system is anticipated. The companies filing change of par value of stock include the Amenia Electric Light & Power Company, Inc., Dutchess County; Carmel Light & Power Company, Inc., Putnam County; Morgan & Hyman Electric Light & Power Company; Lebanon Valley Electric Light & Power Company; Salem Light, Heat & Power Company, Washington County; Champlain Electric Company; Katonah Lighting Company, Westchester County; Chasm Power Company; Harlem Valley Electric Corporation; Chatham Electric Light, Heat & Power Company, Columbia County, and Plattsburgh Gas & Electric Company, Clinton County.

Stock and Bond Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stocks is $100.)

Companies	Bid Price Saturday, May 16	Low 1925	High 1925
PREFERRED STOCKS			
Operating Companies			
Adirondack Power & Light 7 per cent	100	98	102
Appalachian Power, 7 per cent	97½	92	100
Arkansas Light & Power 7 per cent	95	92	98
Asheville Power & Light 7 per cent	a 99	99	100
Central Illinois Public Service 6 per cent	90	84	93
Colorado Power 7 per cent	94	93	98
Connecticut Light & Power 7 per cent	106	105	110
Consumers' Power 6 per cent	92	90	93½
Dayton Power & Light 6 per cent	95	88	100
Duquesne Light 7 per cent	a108½	105	110
Eastern Texas Electric 6 per cent	100	100	105
Empire District Electric 6 per cent	78	78	85
Fort Worth Power & Light 7 per cent	a101	101	102
Great Western Power 7 per cent	98	...	...
Illinois Northern Utilities 6 per cent	88	82	92
Illinois Power & Light 7 per cent	94½	92½	98
Kansas Gas & Electric 7 per cent	a100	99	100
Long Island Lighting 7 per cent	102	100	105
Minnesota Power & Light 7 per cent	a 98	98	98½
Mississippi River Power 6 per cent	90	87½	92
Nebraska Power 7 per cent	a100	100	101
Niagara Falls Power 7 per cent—25	28½	28	29
Niagara, Lockport & Ont. Power 7 per cent	106	101½	110
Northern States Power 7 per cent	96	95	100
Ohio Public Service 7 per cent	97	97	100
Pacific Gas & Electric 6 per cent	93	92	97
Pacific Power & Light 7 per cent	a 99	99	100
Penn-Ohio Power & Light 7 per cent	94	91	100
Pennsylvania Power & Light $7—no par	a103	102½	103½
Penn. Public Service 7 per cent	90	90	100
‡Philadelphia Electric 8 per cent—£5	38	37½	45
Southern California Edison 8 per cent	120	115	122
Tennessee Electric Power, 6 per cent	82	80	84
Texas Power & Light 7 per cent	a100½	100	102
Utah Power & Light 7 per cent	a 99½	99½	101
Western States Gas & Electric 7 per cent	89	82	89
Yadkin River Power, 7 per cent	a 99½	99½	101
Holding Companies			
American Gas & Electric 6 per cent—no par	87½	85	89
American Light & Traction	98	93	98
American Power & Light 6 per cent	88	84	90
American Public Service 7 per cent	91	88	94
American Public Utilities 7 per cent	88	87	95
American Water Works & Electric 7 per cent	a104	95½	104½
Associated Gas & Electric 7 per cent—1 per cent extra—no par	a 52	...	...
Associated Gas & Electric—$6—no par	84	...	...
Carolina Power & Light 7 per cent	103½	100	105
Central Indiana Power 7 per cent	89	88	95
Cities Service 6 per cent	81	80	83
Commonwealth Power 6 per cent	81½	80	82½
Consolidated Gas 6 per cent—50	a 59½	...	...
Continental Gas & Electric 7 per cent pr. pf.	90	89	95
Electric Bond & Share 6 per cent	a103	103	104
General Gas & Electric—$8—no par	111	104½	114
*Middle West Utilities 7 per cent	96	91½	98½
National Power & Light—$7—no par	98	95	99
North American 6 per cent—50	a 49½	46½	49½
Public Service Corp. of N. J. 7 per cent	100½	96½	101½
Public Service Corp. of N. J. 8 per cent	a113½	109	113½
Standard Gas & Electric 8 per cent—50	a 52½	50½	53½
†United Gas Improvement—50	58½	56½	58½
United Light & Power—$6.50—no par	84	83	88
COMMON STOCKS			
Operating Companies			
Adirondack Power & Light—50	58	31	62
Appalachian Power—no par	77	70	83
Arkansas Light & Power	75	65	85
Brooklyn Edison	a135	120½	135
Buffalo General Electric—no par (new)	62	44	66
*Commonwealth Edison	a135½	130½	139
§Consolidated Gas, Electric Light & Power	41½	32	44
Dayton Power & Light	420	180	460
Detroit Edison	a120½	110	120½
|| Edison Electric Illuminating of Boston	206	200	207½
Long Island Lighting (new)	80	60	85
Mississippi River Power	41	37	42
Montana Power	a 82	64	86½
Niagara Falls Power—no par	69	45½	69
Niagara, Lockport & Ontario Power—no par	62	60	73
Northern Ohio Power	11	5	13½
Northern States Power	115	103	118
North Texas Electric	40	40	70
Pacific Gas & Electric	108	102½	109½
‡Penn Central Light & Power—no par	63½	60	64½
§Pennsylvania Water & Power	138	126½	144½
‡Philadelphia Electric—25	38½	37½	47½
Public Service Co. of Northern Illinois	114	97	116
Puget Sound Power & Light	50	49	58
Southern California Edison	107½	102	107½
Tennessee Electric Power—no par	64	47	64
Virginia Power	65	65	92
Virginia Railway & Power	a112	64½	119½
West Penn. Co.	a126	105	126
Holding Companies			
American Gas & Electric—no par	81	70	85
American Light & Traction	165	139	172
American Power & Light	64	52	67
American Public Utilities	74	70	85
American Water Works & Electric	a 63½	34½	63½
Associated Gas & Electric, Class A	a 29½	...	...
Carolina Power & Light—no par	380	290	425
Cities Service (new)	36	34	43
Columbia Gas & Electric—no par	a 65½	45½	66½
Commonwealth Power Corp.—no par	135	106	137
Consolidated Gas—no par	a 84½	74½	85
Continental Gas & Electric	85	77	90
Electric Bond & Share Sec. Corp.¶	a 79	79	80
Electric Power & Light	a 33½	17⅞	33½
Federal Light and Traction	165	114½	168
General Gas & Electric	97	72	102
Lehigh Power Securities—no par	125	82	125
*Middle West Utilities—no par	93	82½	102½
National Power & Light—no par	295	185	295
North American—10	a 50	41½	50½
Philadelphia Co.—50	a 58½	51½	59½
Power Securities—no par	18	...	...
Public Service Corp. of N. J.—no par	a 71½	62½	72½
Standard Gas & Electric—no par	a 53½	40½	53½
United Gas & Electric (Conn.)—no par	31	26	37½
Utah Securities	144	41½	144
BONDS			
Operating Companies			
Adirondack Power & Light 6s	1950	105	102½ 105
Alabama Power 5s	1946	98½	96 100
Appalachian Power 5s	1941	98½	96 99
Brooklyn Edison 5s	1949	103	99½ 103
6s	1930	105	104 105½
Cleveland Electric Illuminating 5s	1939	100½	100 101½
Commonwealth Edison 5s	1943	101	99½ 102
5s	1953	99½	98½ 101
Consol. Gas, Elec. Lt. & Pwr. 4½s	1935	96½	95½ 97
6s	1949	107½	104½ 107½
Consumers' Power 5s	1936	99½	99 100½
5s	1952	97½	90½ 98
Detroit Edison 5s	1933	101½	99½ 102½
Duquesne Light 6s	1949	105½	104½ 107
Great Western Power 5s	1946	97½	95 98½
Kansas City Power & Light 5s	1952	99½	95½ 99½
Mississippi River Power 5s	1951	98½	96½ 100
Montana Power 5s	1943	99¾	97½ 100½
New England Power 5s	1951	101½	100½ 102
New York Edison 6½s	1941	114½	112 115
Niagara Falls Power 6s	1932	106	103½ 106
Northern States Power 5s	1941	98½	93 98½
6s	1941	104½	103 107½
Ohio Power 7s	1951	106½	106½ 107½
Pacific Gas & Electric 5s	1942	97½	93½ 97½
Pennsylvania Water & Power 5s	1940	100½	99½ 102
‡Philadelphia Electric 5s	1966	102½	100½ 102½
5½s	1947	106½	103½ 106½
6s	1941	107½	106 107½
Portland Electric Power 6s	1947	97½	96½ 97½
Southern California Edison 5s	1939	99½	99½ 101
Tennessee Electric Power 6s	1944	103½	102½ 104½
Texas Power & Light 5s	1947	102½	99½ 102½
Toledo Edison 5s	1937	98	97 99
Utah Power & Light 7s	1941	109½	108½ 110
5s	1944	97½	91 97½
Holding Companies			
Alabama Traction, Light & Power 5s	1962	92	86 94
American Gas & Electric 6s	2014	96½	96½ 97
American Power & Light 6s	2016	95	94 95½
Amer. Water Works & Electric 5s	1934	96½	92½ 96½
Associated Gas & Electric 6½s	1954	a102½	... ...
Central Indiana Power 6s	1947	98	95½ 98½
Commonwealth Power 6s	1947	101	97½ 101½
Consolidated Cities Lt., Pwr. & Tr. 5s	1962	79½	75½ 80½
Illinois Power & Light 6s	1953	100½	100½ 102
United Light & Railways 5s	1932	95½	93½ 96½
6s	1952	98	95½ 100
ELECTRICAL MANUFACTURING COMPANIES			
PREFERRED STOCKS			
Allis-Chalmers Manufacturing		a106	103½ 107
*National Carbon		124	120 124
Worthington Pump & Machinery A		84½	79 88
COMMON STOCKS			
Allis-Chalmers Manufacturing		a 80	71½ 86½
American Bosch Magneto—no par		a 32½	26½ 54½
Electric Storage Battery—no par		a 65½	60½ 70½
General Electric		a285	227½ 320
General Electric—10		a 11½	11 11½
Hurley Machine—no par		52½	41½ 56
†Wagner Electric		39½	26½ 50
Westinghouse Electric & Manufacturing—50		a 73½	66½ 84
Worthington Pump & Machinery		a 42	36½ 79½
BONDS			
General Electric 3½s	1942	85½	83 85½
5s	1952	105½	101½ 105½
Robbins & Myers 7s	1952	64½	64½ 73½
Western Electric 5s	1944	100½	98 100½
Westinghouse Electric & Mfg. 7s	1931	107½	106½ 108½

*Chicago Stock Exchange. †St. Louis Stock Exchange. ‡Philadelphia Stock Exchange. || Boston Stock Exchange § Baltimore Stock Exchange.
a Bid price, low and high, Tuesday, May 19. ¶Quoted at 102 last week in error.